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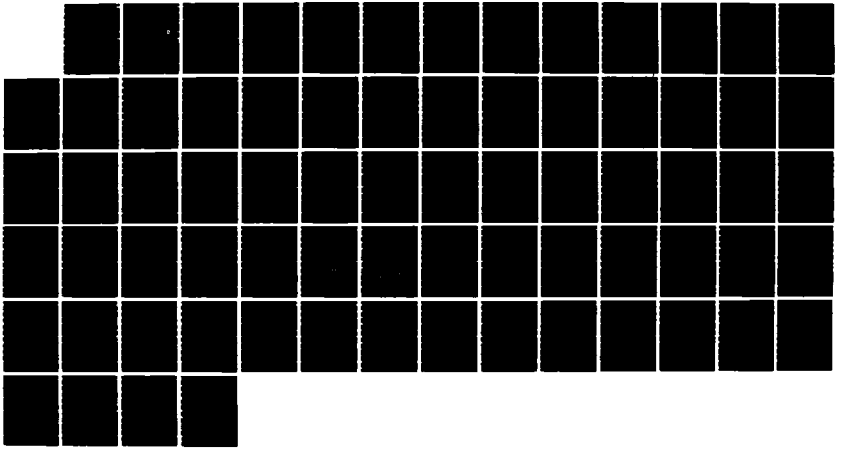

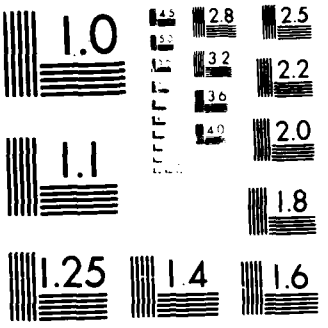

LOCAL AUTOMATION MODEL: PROGRAM SPECIFICATION -- USER ACCESS FOR CATALOGING AND RETRIEVAL

September 1985

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The Local Automation Model project will demonstrate the integration of a local collection management system with access to remote bibliographic data bases. Through an intelligent gateway processor, users of the system will be able to access a local catalog and the Defense Technical Information Center (DTIC) Technical Reports (TR) data base simultaneously. The system will consist of a commercial software package (for local collection management) integrated with a subset of the Lawrence Livermore National Laboratory (LLNL) Technology Information System (an intelligent gateway). The intelligent gateway permits

20. Abstract (Continued)

sharing of bibliographic resources between the network of technical libraries and information centers within the Department of Defense (DoD) and the DoD technical information clearinghouse -- DTIC. This program specification describes the requirements and design details for integrating the operation of the two software components through development of a standard command language and user interface. Thus, with one set of commands and procedures, a user will be able to simultaneously search heterogeneous data bases, merge and postprocess search results, and share citations to new holdings with other members of the network. This will produce a significant reduction in the duplication of manual and intellectual effort associated with sharing geographically dispersed, heterogeneous bibliographic resources.

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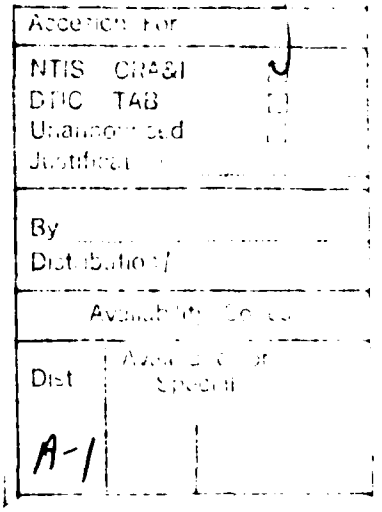

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SECTION 1. INTRODUCTION

1.1 Purpose.

This program specification for the Local Automation Model (LAM) provides guidance to develop programs for user access to the cataloging and retrieval system functions. The program functions and processing steps described in this specification provide a consistent framework for designing, developing, testing, and implementing a user interface for the prototype system. The program specification describes the sequence of events (processing steps) and flow of data throughout the bibliographic retrieval and cataloging functions provided by the LAM. Specific implementation methods, for the most part, are not included in the descriptions. Selection of implementation methods is left to the applications programmer working in conjunction with the system designer.

1.2 System Components.

In describing the requirements for and design of the LAM prototype, reference will be made to three logical components of the system. First, the user interface refers to the programs that provide and control user access to the functions and features of the system, receiving inputs from the user (primarily from a terminal keyboard) and displaying results of system operations to the user (primarily on a video display screen). Second, the library package refers to the programs performing local collection management functions related to retrieval and cataloging of bibliographic information and circulation management and control. Third, the intelligent gateway encompasses the software installed to support the exchange of bibliographic information between the local system installed at the technical library and remotely located, heterogeneous data bases containing bibliographic or numeric data.

This program specification describes the LAM user interface and was developed with emphasis on the functions required for user access to the system. That is, the sequence of processing steps and description of control and data flows are presented in the likely order of execution by a user and with respect to typical or expected user activities. Other component and system interactions are thus

covered indirectly and in a sequence that may contradict actual operations. However, these other interactions are represented in the process descriptions and have been considered in development of the program specification.

1.3 Project References and Description.

The LAM encompasses a system design, development, and evaluation project sponsored by the Defense Technical Information Center (DTIC) located in Alexandria, Virginia. The requirements for and design of the system are documented in:

- Local Automation Model: Conceptual Design Document, Logistics Management Institute, April 1983
- Local Automation Model: Functional Description, Logistics Management Institute, October 1983
- Local Automation Model: System Specification, Logistics Management Institute, February 1984
- Local Automation Model: Test Plan for Software Benchmarking, Logistics Management Institute, March 1985
- Local Automation Model: Implementation Planning Procedures, Logistics Management Institute, August 1985.

Other references pertinent to the design, development, and implementation of the prototype system are listed as follows:

- Sperry Univac Uniscope Display Terminal Programmer Reference, Sperry Rand Corporation, 1975
- TIS -- An Intelligent Gateway Computer for Information and Modeling Networks -- Overview, Lawrence Livermore National Laboratory, Report No. UCRL-53439, August 1983
- ADP Security Manual: Techniques and Procedures for Implementing, Deactivating, Testing, and Evaluating Secure Resource-Sharing ADP Systems, Department of Defense, DoD 5200.28-M with Change 1, 25 June 1979
- Security Requirements for Automatic Data Processing (ADP) Systems, Department of Defense, DoD Instruction 5200.28 with Changes 1 and 2, 29 April 1978
- Guideline for Computer Security Certification and Accreditation, U S Department of Commerce, National Bureau of Standards, Federal Information Processing Standards Publication 102, 27 September 1983.

The prototype system -- planned for implementation at the Defense Nuclear Agency (DNA) in Alexandria, Virginia -- will provide the opportunity to demonstrate and evaluate an automated library system with special features for bibliographic information sharing. The system will support conventional collection handling capabilities such as original cataloging and citation retrieval. In addition, the system will facilitate sharing of information resources between Department of Defense (DoD) technical libraries and the DTIC.

Resource sharing capabilities include automatic searching of both the local technical library catalog and the DTIC Technical Reports (TR) data base using a single search language and format, downloading information from the TR data base to the local system, and machine-aided translation of locally created catalog citations into a format acceptable for entry in the TR data base. Thus, with one system and one set of commands, a technical library can, without duplication of effort or proliferation of systems, maintain and expand a catalog tailored to local needs, access the wealth of information contained in the TR data base, and contribute directly to the timely dissemination of scientific and technical information by direct cataloging in the TR data base. These features are provided by intelligent gateway software residing on the system at the technical library.

The system was initially designed to meet the resource sharing needs of technical libraries participating in the Shared Bibliographic Input Network (SBIN) sponsored by the DTIC. (The SBIN was established initially as an experiment in shared cataloging and has since been established as an ongoing DTIC program.) In addition to providing inputs to a local catalog, SBIN member libraries catalog in the TR data base using a separate input system supported by the Defense Research Development, Test, and Evaluation (RDT&E) On-Line System (DROLS). In large part, initiation of and requirements for the LAM project reflect the need to reduce the burden of effort placed on SBIN members and thereby promote information sharing. However, the local collection management capabilities coupled with access to remote bibliographic resources are beneficial to any technical library.

Included in the LAM project is the development of an acquisition strategy and plan for a production system. Experience gained through operation and evaluation of the prototype system will

contribute directly to development of the acquisition plan. Since publication of the Functional Description and System Specification documents, libraries and information centers outside of the SBIN have expressed interest in implementing the system. On the basis of this interest, the DTIC will make the production system available to other DoD technical libraries.

The prototype and production systems will be implemented using commercially available library software to provide the local collection management functions. The gateway features available in the prototype system will be provided through adaptation of the Technology Information System (TIS) developed at the Lawrence Livermore National Laboratory (LLNL). Commercial software for the prototype system will be selected through performance benchmarking. Competitive bids will be solicited for acquisition of the production system software.

1.4 Terms and Abbreviations.

The following terms, acronyms, and abbreviations are used in this document:

- ADP: automated data processing
- ASCII: American Standard Code for Information Interchange
- COM: Computer Output Microfilm
- CNWDI: Critical Nuclear Weapons Design Information
- CRT: cathode ray tube
- DBA: data base administration
- DBMS: data base management system
- DNA: Defense Nuclear Agency
- DoD: Department of Defense
- DROLS: Defense RDT&E On-Line System
- DTIC: Defense Technical Information Center
- HIPO: Hierarchy-Input-Process-Output -- a structured system design methodology documenting logical flow through use of input-process- output charts
- LAM: Local Automation Model
- MIPR: Military Interdepartmental Purchase Request

- RDT&E: Research, Development, Test and Evaluation
- RTIS: Remote Terminal Input System
- SBIN: Shared Bibliographic Input System
- TIS: Technology Information System
- TR data base: The Technical Reports data base operated and maintained by DTIC containing over 1.5 million citations to reports published or sponsored by DoD.

SECTION 2. SUMMARY OF REQUIREMENTS

2.1 Program Description.

The LAM prototype system applications software consists of three major logical components: (1) a commercial library software package supporting local collection cataloging, reference, and circulation management and control; (2) an intelligent gateway providing access to the DTIC TR data base for cataloging and retrieval; and (3) a user interface for providing and controlling access to system functions. The gateway also provides postprocessing capabilities such as transferring TR data base citations to the local system, translating and merging citations from both sources into a common format, eliminating duplicate or unwanted citations, sorting citations, and reordering citation contents (data fields).

To meet the objectives of the system design, users must have access to the functions performed by either the commercial library software package or the intelligent gateway through a common set of commands and formats. That is, regardless of the catalog being searched or the destination of the citations for the holdings being cataloged, only one set of commands must be used.

For design purposes, the user interface represents the user's point of entry into the system. In application, the user interface may exist as an actual physical component serving as an intermediary between the user and the applications software of the library package and the intelligent gateway. However, the features and processing steps described as part of the user interface may be performed by software within the library software package or the intelligent gateway.

Software development for the prototype system will be limited to (1) implementing processing steps not provided by either the commercial library package or the intelligent gateway and (2) providing for the interoperation of these two components so that a single set of commands invoke nearly parallel (e.g., simultaneous searching) or functionally similar (e.g., creating a citation for either the local catalog or the TR data base) processing steps without duplication of data entry. Software that supports the interoperability of the library software package and the intelligent

gateway may physically be part of either of these two components. As a last resort, interoperability of the two components will be provided through software developed for the third component -- a user interface.

Presenting the requirements for and design of the user interface as a separate and distinct system component is done for two reasons. First, it provides a consistent point of reference for ensuring that the overall system design meets functional requirements. Second, it provides a neutral forum for investigating and establishing requirements for software integration. The technical risk inherent to the LAM project centers on integrating a commercial software package with intelligent gateway software. Viewing the processing steps and data flow of the system through this third component -- the user interface -- eliminates the need to resolve software integration questions during development of the detailed system design and thus facilitates the establishment of the preliminary detailed design.

However, a description of the processing steps and data flow covering the entire range of user-oriented functions provides a solid foundation for addressing software integration. Starting with the description for the user interface, interactions between the software components can be readily established. Decisions concerning software augmentation and modification will be made on the basis of technical factors (e.g., ease of modification, existing software capabilities, comparative performance advantages) rather than on the basis of design preference. Thus this program specification does not dictate the format and content of a program or group of programs. Rather, it establishes a starting point and framework for integrating the commercial library package with the intelligent gateway software.

2.2 Program Functions.

The LAM system supports three basic library functions: reference, cataloging, and circulation management and control. The system maintains an on-line catalog of citations to holdings in the local technical library collection. Users can create new citations, modify existing citations, and retrieve citations from the local catalog. As holdings are charged out to patrons and subsequently returned, the system maintains a record of these transactions. These functions are supported by a

commercially available library software package installed on a computer located in or near the technical library.

In addition, the system provides the user with a link to the DTIC TR data base. This link is used to search for and retrieve citations from the data base and to download (transfer) copies of citations from the TR data base to the local system. Furthermore, the system enables the user to transfer citations from the local system to the TR data base. These functions are supported by an intelligent gateway resident on the technical library computer.

The commercial software package and the intelligent gateway share common functions: cataloging and retrieval. The commercial library package focuses on local collection cataloging and retrieval, while the intelligent gateway handles cataloging and retrieval access and data transfers with remote systems. (Circulation management and control is largely a local system function and is not discussed in this program specification.) With these functions in common, users of the system must have access to functions in either component through a common set of commands. Also, user inputs for the same function must be shared by the two components to eliminate duplicate data entries by the user. In addition, system outputs directed to the user must be similar for functions performed by either component.

In many cases, the processing steps described in Section 4.5, "Program Logic," for the user interface will be provided by programs already included in either the library software package or the intelligent gateway. The key to prototype implementation is integrating the two components in a manner consistent with the requirements for a single command language (i.e., a single set of commands that invoke nearly parallel or similar processing steps in both components) and sharing data inputs and outputs between components without user intervention. The types of component interactions required for the system are summarized as follows:

- The user directs the system to simultaneously search the local catalog and the DTIC TR data base. The user enters the search criteria and search variables. The system translates the user's commands into a form suitable for both components, executes the corresponding processing steps in both components using the search variables, and reports the results of executing the processing steps.

- The user enters descriptive and subjective cataloging data using the system. At the user's indication, the system updates the local catalog with the new citation, permits modification of the citation by the user (to meet TR data base format and content restrictions), and/or transmits the modified citation to the DTIC for addition to the data base. The system will translate as many of the citation data elements as is practical (e.g., reformat dates, reduce author's names to initials, reduce full words to single character codes).

- The user performs a search of the local catalog, the TR data base, or both. At the direction of the user, the system downloads data from the remote data base, reconciles citation formats between the local system and the TR data base, and provides a range of post-processing utilities applicable to the merged data set of citations. Postprocessing utilities will support the identification of duplicate or near-duplicate citations, provide for sorts on user-selected fields, and perform other functions associated with citation postprocessing. In addition, the system will provide the capability to translate, as necessary, the downloaded citations into a format suitable for addition to the local catalog.

2.2.1 Accuracy and Validity.

Support of LAM functions requires few arithmetic operations. Basically an administrative -- rather than scientific -- data-processing application, the LAM will be able to produce statistical reports related to library circulation operations and acquisition budget management. Some of these reports will include data elements representing dollar amounts. These data will be stored as real numbers and may represent a range of amounts from 100,000 to -100,000. The accuracy requirement for such fields is two digits to the right of the decimal point (representing cents). Computations using these amount fields must preserve that level of accuracy.

Data elements representing dates (e.g., report date) will use the DTIC standard format for descriptive cataloging. This format consists of one or two numeric digits, three alpha digits, and two numeric digits (e.g., 1 JAN 83 or 15 FEB 83) Data that represent current dates should be drawn from the LAM computer system.

The need to process data elements representing security classification or special handling procedures increases the level of importance for accuracy and validation. Data elements that depict this information require both human verification and software verification. The software edits must be capable of cross-checking all data elements that contain or refer to associated data elements. An example of this type of validation is REPORT CLASSIFICATION. An entry in this field is mandatory. In addition, data fields that represent REGRADE CATEGORY, REPORT CLASSIFICATION, and REPORT TITLE will be validated.

Data integrity is maintained in two ways: first, through automated range and edit checks on selected data elements entered into the system, and, second, through manual checks by the library staff. All criteria for data element editing are shown in Appendix B, "Data Elements for the Defense Nuclear Agency Local Automation Model." In addition, a thesaurus (authority file) will be available to validate all posting terms and descriptors upon entry into the system.

Required data elements are identified in Appendix B (see column entitled "Required") The physical format and characteristics of all such data elements entered in the system will be verified automatically to ensure the integrity of the data base. These accuracy and validation edits will be performed by means of the LAM software/data dictionary. Edit requirements for data elements in the TR data base are defined in the DTIC Data Element Dictionary.

The LAM will transmit to and receive data from the DTIC TR data base via communication lines. The LAM will be designed on the basis of current DTIC communication protocol standards (DROLS/RTIS) and will use the data transmission error-checking routines provided by DROLS/RTIS. Error-checking routines are designed to verify complete and accurate transmission of messages between devices and to provide methods for retransmission of message blocks that are incomplete or erroneous.

2.2.2 Timing.

The timing requirements placed on the LAM are as follows:

- Response times to user queries of the local data base for bibliographic searches or patron information will be, on average, 7.5 seconds or less.
- Response times for executing nonsearch commands (e.g., selecting system functions, generating standard output reports) will be, on average, 3 seconds or less.
- Response times for queries of the DTIC TR data base are dependent on conditions external to LAM operations (e.g., DROLS transaction volume, complexity of the search selected). However, LAM users should ensure that the structure of the search submitted to DTIC is well-defined and as narrow in scope as possible, consistent with search objectives. This practice should contribute to improved response times from the TR data base and DROLS.
- As an interactive system with as many as five independent components/modules, the LAM will have no routinely scheduled sequential processes involving all components simultaneously.

- Sequencing and interleaving of programs within individual system modules is described in Section 4.5, "Program Logic."

- The software selected for system implementation must be capable of managing or controlling concurrent data base access by users operating within separate LAM modules. It is likely that simultaneous use of different modules will produce concurrent or nearly concurrent data base access requests.

2.3 Flexibility

Capabilities will be provided for adapting the LAM to changes in operating requirements. The following are likely changes in operating requirements and with the corresponding system features that provide the required flexibility:

- Ad Hoc Reports. The LAM will be capable of producing ad hoc reports to support analysis of library operations and management of library resources.

- DTIC Interface. Although none are now scheduled, changes in the protocols and syntax in use by the DTIC (DROLS) after implementation of the test site system would require development and implementation of changes in the protocol and syntax translation software that was first developed for the LAM.

  User Interface. The LAM will provide two levels of user operation: a fully prompted version with extensive "help" and error messages for occasional or inexperienced users and an abbreviated or compact set of user instructions to speed the work of experienced users. Either level of operation may be selected by a user during a session on the system.

SECTION 3. ENVIRONMENT

This section provides general information on the LAM hardware and software environment. Specific details of hardware and software characteristics will be established on the basis of results from commercial software package benchmarking. Many of the software characteristics and requirements listed in this section pertain to the commercial software package component of the system. However, some details pertain specifically to the intelligent gateway and are included to provide information on software integration requirements and data transfer between the DROLS and the local system.

3.1 Support Software Environment.

A commercial software package for local collection management functions and processes will be selected after benchmarking is completed; therefore, the specific support software cannot be described until that software is selected. However, support software characteristics have been developed on the basis of system operating requirements derived from applications software performance requirements. These support software requirements, which apply mainly to the commercial software package selected during benchmarking, are described in the following paragraphs.

3.1.1 Operating System and Utility Program Requirements

User Access. The LAM will provide on-line, interactive access for multiple users. For the DNA test site, simultaneous access for up to seven users is required. This capability may be provided through use of interactive time-sharing.

Disk File Access. Disk file access is required to support bibliographic data storage and retrieval. The disk file access method must support the file access method used for data base management.

File Maintenance. Routines for performing disk file backup, archiving, and restoration are required. Requirements for performing system and data base backups, restarts, and recoveries are described in Section 4.1, "General Operating Procedures," of the System Specification document.

Data Sorts and Merges. Several LAM applications require a sort or merge routine for processing data base extracts. This capability may be provided by a system utility or by a routine contained in the DBMS.

Applications Development Language. The operating system must support the applications language selected for the LAM. This includes supporting a compiler (if a compiled language is selected), a linkage editor for software maintenance, and a program loader for updating or creating application programs.

Compatibility. The operating system must provide a compatible environment wherein operation of any single system software element (i.e., applications, data base management, utilities, communications, syntax/procotol translation) does not prevent the concurrent operation of any other software element.

3.1.2 Data Base Management Requirements

General. A method will be selected for performing data base management for the LAM. This method may be an integral part of a library software package or may be a distinct DBMS product. Regardless of source, the data base management method must perform all applications program-data base interfaces for locating, updating, and extracting data stored on magnetic disk devices. The method must permit development and execution of ad hoc reports without requiring development or specification of data access procedures by the user. Additionally, the method used for data base management must permit on-line, interactive access to the data base by application programs. Some of the capabilities specified in this subsection may be performed by a data dictionary either included as a part of a DBMS or provided as a separate element within the system.

Concurrent User Access. The method selected for data base management must permit or control concurrent user access to the data base. If concurrent access is not permitted, then the means for automatically queuing and scheduling data base access must be provided.

Query Language. The data base management system or method selected must support a query language for developing standard and ad hoc reports. The query language should be an integral part of the data base management system in that the language is designed specifically for that DBMS. Alternatively, an applications language interface is required to meet report preparation needs. The query language must support on-line, interactive development, testing, editing, and execution of ad hoc and standard reports.

Data Element Redefinition. Once operational, the system must support redefining modifying data element formats, deleting data elements, and adding data elements as required by the library staff. This redefinition must be accomplished without interrupting normal user access to the data contained in the data base.

Data Base Restructuring. The method selected for data base management within the LAM must permit development and implementation of alternative data base structures for other libraries acquiring the LAM. Other libraries may use different catalog formats and may choose to include different data elements in the data base.

Boolean Logic and Text String Searches. The query language and DBMS used within the LAM must provide Boolean logic and text string search capabilities for use in processing local catalog reference searches.

Input Editing and Verification. Physical formatting of all data base inputs will be performed This capability will be part of the data base management methods used to control data base content and integrity. Additionally, key data elements (specified as "Required Fields" in Appendix B) will be edited for content as well as format. Inputs for these data elements will be edited for allowable ranges or values. This editing is considered part of data base management.

Authority File Cross-Referencing. The LAM will use an authority file of subject terms/ descriptors to control subjective cataloging and reference searches by subject. All subject

terms/descriptors entered into the system will be edited against this authority file. The technical library staff may modify this file as required to meet local needs. The authority file will cross-reference authorized terms/descriptors with common substitutes or synonyms to aid the user in developing subjective catalog inputs and in developing reference searches.

3.1.3 Protocol and Syntax Conversion Requirements.

General. As used here, the term protocol refers to the set of conventions governing the format, physical composition, and relative timing of messages exchanged in a communications network. Similarly, the term syntax is used to describe the set of rules governing the structure, format, and content of either a programming language or the method used for data representation by a program or the computer itself. Protocol and syntax translation or conversion is required for communication between computers using different communications protocols and data representation syntax. This translation or conversion can be performed without user intervention, making the conversion process transparent to the system users.

Syntax Conversion. The LAM will use a single query language for retrieving citations from both the local catalog and the TR data base. Queries for the TR data base will be converted by the LAM and transmitted to the DTIC without user intervention. Similarly, postprocessing references found by a query will be performed using a single language.

Protocol Conversion. The LAM will convert communications protocols for transmissions between the local system and the TR data base. The communications protocol used by the DTIC is described in Section 3.2, "Interfaces." The conversion capabilities of the LAM include establishing the communications link and logging the user into the DROLS.

3.1.4 Microfilm Interface Requirements.

The LAM will provide data for preparing COM. A magnetic tape containing the material to be microfilmed will be produced and transferred to the COM device. Tape format requirements are dependent on the type of COM device used. The test site library will use COM in lieu of hard-copy shelf lists. Other libraries may elect to implement with capability as an optional feature of the system.

3.2 Interfaces.

The LAM will interface with the DTIC UNIVAC 1100/82 computers via DROLS/RTIS. This interfacing requires the LAM hardware and software to interface with a DCP/40 communications processor and emulate UNICOPE 100/200 (U 100/200) terminals. That is, the LAM must respond to a UNIVAC DCP/40 communications processor using a direct connect, 2,400-baud, synchronous line that has been encrypted for classified (SECRET) transmissions. To emulate a U 100/200, the LAM must accept the ASCII character set (upper and lower case) and a full-screen (1,920 pixels, 80 columns x 24 lines) processing mode. The LAM must be able to dial the DROLS/RTIS number and make the proper line connection. The DTIC uses commercial and Government lines to connect remote users.

The DROLS allows remote users to enter only a predefined set of commands that are validated during the user session. These commands allow DROLS users to access bibliographic information in the TR data base.

3.3 Storage.

The central processing unit selected for the prototype system will have 4 megabytes of main memory. Approximately 1 megabyte will be allocated for use by the operating system and utilities. This leaves 3 megabytes available for processing applications software. For planning purposes, maximum program size should be limited to 256 kilobytes of main memory or less.

The prototype system will require approximately 330 megabytes of permanent on-line disk storage, allocated as follows:

- Bibliographic catalog and indexes: 300 megabytes
- Applications software and utilities: 6 megabytes
- Authority files: 10 megabytes
- Patron file and indexes: 2 megabytes
- Other catalog files and indexes: 10 megabytes.

3.4 Security and Privacy.

The DNA plans to store bibliographic citations classified up to SECRET. None of the application or DBMS software associated with operation of the LAM will be classified. The highest

classification level for data exchanged between the DTIC TR data base and the local system will be SECRET. Abstracts and indexes produced by the system in response to a patron query may be classified SECRET. These outputs may take the form of terminal screen displays or hard-copy printouts. When classified titles and descriptors are used in the catalog, any title or subject term, shelf list, or other report produced from the catalog must be classified to at least the same level.

The prototype system will operate in a dedicated security mode, meaning that the central processor and all of its connected peripheral devices and remote terminals will be used and controlled only by users having the required security clearance and the need-to-know. The access, personnel, physical, and communications security controls established in this mode for the computer facility, communications lines, peripheral devices, and areas containing remote terminals are normally adequate to meet the security requirements prescribed in "Security Requirements for Automatic Data Processing (ADP) Systems," DoD Directive 5200.28, Section VI. For technical libraries that will not use the LAM to store or process classified data, the security considerations discussed in this section are not relevant.

The following LAM security requirements are derived from DoD Directive 5200.28, DNA Directive 5200.28A, and DoD 5200.28-M.

3.4.1 System Physical Security.

Installations that are planning to implement a LAM have two means for providing system physical security. One is to locate the system in a secure, TEMPEST-shielded environment, operating in a dedicated security mode, as defined above. With this alternative, an installation may not have to obtain TEMPEST-certified equipment because all equipment would be in a shielded environment such as a vault or a data-processing installation authorized to handle classified data. The LAM at the DNA will be set up this way.

The alternative is to obtain only TEMPEST-certified equipment (processor, storage devices, terminals, printers, etc.), place the system or its components in an unshielded area, and restrict physical access to it. In addition, interdevice communication, as from the processor to a terminal, must be secured by shielded cables or other means and unauthorized access to the system must be

prevented by software controls. Under either alternative, a site would require encrypted communication lines for accessing classified data from the TR data base.

The following additional LAM security measures are required:

- Access. The system must limit access to authorized users by requiring the user's name and password.
- Password. The system must restrict authority for assignment of user passwords to the installation security officer or designated representative.
- Software Protection. The system must protect its software from unauthorized changes.
- Unauthorized Try. The system must allow no more than "n" attempts at access to the system. After "n" attempts, access is to be denied and the system manager notified. (The value of "n" will vary and will be determined by the system manager.)
- Audit Log. An audit log must be maintained as a history of the use of the LAM to permit regular security reviews of system activity.
- Hardware Requirements. The following hardware requirements are necessary for LAM security:
  - -- All operator codes must produce known responses by the computer.
  - -- All registers must be able to protect their contents by error detection or redundancy checks.
  - -- Automatic programming intercept must be incorporated to control malfunction by system or operator.
  - -- "Read," "write," and "execute" access rights of the user must be verified at every fetch cycle of an instruction and its operand.
- Aborts. Security safeguards are to be provided to cover unscheduled system shutdown (aborts) and subsequent restart, as well as scheduled system shutdown and operational start-up

3.4.2 Program Security

The following security measures apply to the operating system and application program of the LAM.

- Unauthorized Use. The system must contain a list of authorized users for each program and limit the use of specific programs to authorized users or categories of users.
- Program Modification. The system must provide users with a means of assigning passwords to their programs and must limit access to these programs to library, agency, DoD, Service, and other designated LAM users.

- Operating System. To ensure that all access to materials is made on an access control and identification system that associates the user and his terminal, the operating system must control:

  -- All transfers of material between memory and on-line storage devices and between the computer and any remote device

  -- All operations associated with allocating ADP system resources, memory protection, and system interrupt

  -- Access to operating system maintenance programs and utilities

  -- All other programs.

3.4.3 Data Security.

When the LAM is used to process classified data, it must satisfy all DoD and agency data security regulations, including the following:

- Access Rules. Access rules provide or limit user access to specific files and establish the type of access (e.g., read only, read, and modify). Only authorized library staff members will be permitted "read and modify" access. Access to the user access rules contained within the LAM will be restricted to individuals authorized by the library manager and agency/installation security officer.

- Security Markings. All classified material accessible by or within the LAM must be identified as to its security classification and access or dissemination limitation. All output of the LAM, including citations retrieved from the DTIC data bases, must be appropriately marked. Outputs include both hardcopy (paper or COM) and CRT screen formats. COM output must contain two sets of security markings: one set readable with the naked eye and a second set at the top and bottom of each reduced page.

- Accountability. The LAM site is accountable for all unclassified data that become classified as a result of local postprocessing.

- Disposition. The disposal of LAM data must be secured by means of the erasure and disposition procedures outlined in "ADP Security Manual," DoD 5200.28-M, pages 31-38.

- Data Input to the DTIC. A LAM site must adhere to all security restrictions concerning inputs to the TR data base; in particular, no data above the SECRET level may be transmitted to the DTIC.

- Password Protection. Passwords help protect data, and local standards governing their issuance and protection of passwords must be followed. Additional protection may added to the traditional rules governing password protection For example, the additional protection may be achieved by encryption of the password.

3.4.4 Communications Security.

In the DTIC-LAM network, communications security is focused on two major areas: access control and data protection. In access control, the mechanisms and the environment of the data

communications facility are protected from authorized entry and use Badges, guards, and personal recognition limit access to the system.

Protecting data transmitted over communication networks is difficult because data are transparent. Data are guarded by encryption while they are on a communications path Encryption provides security in that it prevents browsing, but it cannot protect data against sophisticated electronic techniques. Encryption devices and information can be obtained through DoD, DTIC, Service, or agency security representatives.

3.5 Controls.

When the test site LAM system is installed, responsibility for its operational control will be assumed by the DNA. The DBA functions and responsibilities for the LAM will be shared by the ADP staff and the DNA technical library staff.

The primary functions and responsibilities of the DBA are to:

- Review data input procedures to ensure completeness and accuracy of data submissions
- Consult with DNA LAM users to determine whether the contents or organization of the data base require change
- Exercise control over the initiation of update runs, restart/recovery procedures, data base backup procedures, and initiation of report generation.

SECTION 4. DESIGN DETAILS

4.1 Program Documentation Procedures.

This section describes of the processing steps and data flows for the retrieval and cataloging functions performed by the LAM prototype system. These descriptions consist of input-process-output charts augmented by brief narratives covering the processing steps. The Hierarchy-Input-Process-Output (HIPO) design methodology was used to prepare the figures used throughout this section. A description of the HIPO methodology and symbols is contained in Appendix C.

The HIPO charts are organized by a system hierarchy that reflects the decomposition of the system into functions, processes, and processing steps. The system hierarchy is shown in Figure 4-1. The hierarchy chart serves as a visual table of contents for locating elements of the system design. The following numbering convention is used to identify system elements:

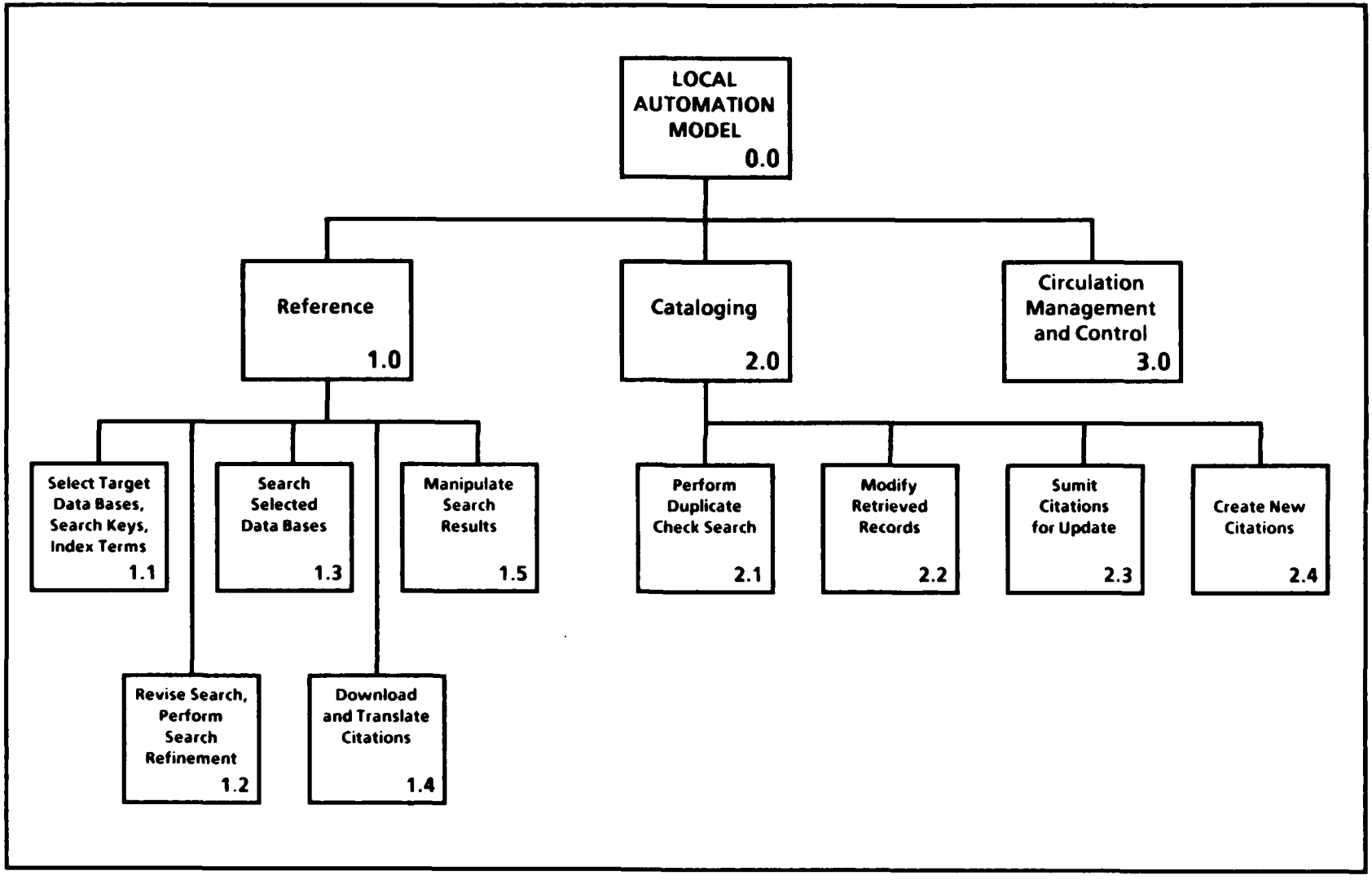
- Functions of the system are numbered 1.0 through 3.0 and correspond to the highest level of the system. The three system functions are reference (1.0), cataloging (2.0), and circulation management and control (3.0).
- Processes within each function are numbered with the function number followed by a decimal point followed by a sequence number for the process. For example, within the function reference (1.0), the process download and translate citations is numbered 1.4.
- Processing steps are a further breakdown of the processes and are numbered accordingly. Within the process download and translate citations (1.4), the processing step translate citations to the local format (not shown in Figure 4-1) is numbered 1.4.2.

In addition to this numbering scheme for the functions, processes, and processing steps, inputs and outputs for each processing step are numbered sequentially as they appear on the HIPO chart. This numbering scheme serves as a directory to detailed input and output format descriptions contained in Table 4-1, Table 4-2, and Appendix A.

4.2 Inputs.

The HIPO charts in Section 4.5, "Program Logic," show all the LAM inputs within the reference and cataloging functions numbered sequentially. These reference numbers appear in the

FIGURE 4-1. LAM SYSTEM HIERARCHY AND VISUAL TABLE OF CONTENTS



lower right-hand corner of each symbol in the "Input" section of each chart. The HIPO charts portray the relationship between inputs and their associated processes and outputs.

The characteristics of each data input, including the input name, HIPO reference number, means of initiation (entry), expected volume or frequency, source, form at source, security classification, and number of constituent data elements are shown in Table 4-1. The data elements that make up each input are listed in Appendix A and described in Appendix B.

4.3 Outputs.

The HIPO charts in Section 4.5, "Program Logic," also show all LAM outputs. For HIPO charts depicting processing-step level of detail, the outputs are numbered sequentially within each function. These reference numbers are found in the lower right-hand corner of each symbol in the "Output" section of the chart.

The characteristics of each data output, including the output name, HIPO reference number, means of display or storage, expected volume or frequency, security classification, and use are shown in Table 4-2.

4.4 Data Environment.

Although the LAM data base will contain three categories of data (catalog/bibliographic, patron, and budget), the reference and cataloging functions will use only one type: catalog/bibliographic data Catalog data may be stored in both the local system and the DTIC TR data base, although some elements are unique to one site or the other. All catalog citations classified above SECRET (or with dissemination restrictions), as well as all patron and budget data, will be stored at the local site only. Appendix B lists the data elements recommended for the test site data base. The catalog is expected to require approximately 350 megabytes of on-line disk storage, including overhead.

Catalog data should be retained for the life of the holding. If a library is required to maintain records for past holdings, an inactive catalog file can be established.

The interrelationships of the processing steps to the data bases is shown in the HIPO charts

TABLE 4-1. LAM INPUT CHARACTERISTICS

FUNCTION/NAME OF INPUT	HIPO REF. NO.[a]	MEANS OF INITIATION	EXPECTED VOLUME OR FREQUENCY (PER WEEK)	SOURCE	FORM AT SOURCE	SECURITY CLASSIF.	CONSTITUENT DATA ELEMENTS
Reference							
Selection of target data base	1.1.2		75-150	Library staff	Keyboard entry	Unclassified	
Selection of search terms	1.1.3		75-150	Library staff	Keyboard entry	Secret	
Selection of index key(s)	1.1.4		75-150	Library staff	Keyboard entry	Unclassified	
Selection of parameter set to retrieve	1.1.5		75-150	Library staff	Keyboard entry	Unclassified	
Parameter sets created during current session	1.1.6		75-150	LAM temp. file	Magnetic disk	Secret	
Selection of parameter set to retrieve	1.1.7	Initiated	150-300	Library staff	Keyboard entry	Unclassified	
Stored parameter sets	1.1.8	by	150-300	LAM data base	Magnetic disk	Secret	
Search parameter sets	01.1.4[b]	Operator	75-150	LAM temp. file	Magnetic disk	Secret	See
	01.1.5[b]	Request from a	75-150	LAM temp. file	Magnetic disk	Secret	Appendix A
Search parameter sets	1.2.1	Terminal	250-500	LAM temp. file	Magnetic disk	Secret	
Command to display search parameter sets chosen	1.2.2		250-500	Library staff	Keyboard entry	Unclassified	
Revised search parameter sets	1.2.3		250-500	Library staff	Keyboard entry	Secret	
Display of search parameter sets	01.2.1[b]		250-500	LAM temp. file	Magnetic disk	Secret	
Revised search parameter sets	1.3.1		250-500	LAM temp. file	Magnetic disk	Secret	
Command to perform a search	1.3.2		250-500	Library staff	Keyboard entry	Unclassified	
DTIC TR data base	1.3.3		150-300	DTIC	Magnetic disk	Secret	
Local catalog	1.3.4		200-400	LAM data base	Magnetic disk	Secret	
Formatted search expression	01.3.1[b]		250-500	LAM temp. file	Magnetic disk	Secret	
Transmitted search expression	01.3.3[b]		250-500	LAM temp. file	Magnetic disk	Secret	

[a] Reference numbers are taken from diagrams in Section 4.5, "Program Logic."

[b] All entries in this column refer to inputs, except those preceded by "0", which are outputs generated in a preceding process and used as inputs for the indicated process.

TABLE 4-1. LAM INPUT CHARACTERISTICS (CONTINUED)

FUNCTION/NAME OF INPUT	HIPO REF. NO.[a]	MEANS OF INITIATION	EXPECTED VOLUME OR FREQUENCY (PER WEEK)	SOURCE	FORM AT SOURCE	SECURITY CLASSIF.	CONSTITUENT DATA ELEMENTS
Retrieved citation sets	1.4.1		200-450	LAM temp. file	Magnetic disk	Secret	
Command to download citations to local system	1.4.2		200-450	Library staff	Keyboard entry	Unclassified	
Downloaded citation sets	01.4.2[b]		200-450	LAM temp. file	Magnetic disk	Secret	
Translated citation sets	1.5.2		200-450	LAM temp. file	Magnetic disk	Secret	
Command to merge citations sets	1.5.3		75-125	Library staff	Keyboard entry	Unclassified	
Previously translated citation sets	1.5.4		75-125	LAM temp. file	Magnetic disk	Secret	
Command to postprocess citations	1.5.5		100-225	Library staff	Keyboard entry	Unclassified	
Translated citation sets	1.5.6	Initiated	50-75	LAM temp. file	Magnetic disk	Secret	
Command to store retrieved citation set	1.5.7	by	50-75	Library staff	Keyboard entry	Unclassified	
Search parameter sets	1.5.8	Operator Request from a	25-50	LAM temp. file	Magnetic disk	Secret	See Appendix A
Cataloging		Terminal					
Command to initiate search for duplicates	2.1		125-225	Library staff	Keyboard entry	Unclassified	
Downloaded and translated citation sets	2.2.1		25-75	LAM temp. file	Magnetic disk	Secret	
Bibliographic data	2.2.2		25-75	Library staff	Keyboard entry	Secret	
Displayed citation sets	02.2.1[b]		25-75	LAM temp. file	Magnetic disk	Secret	
Modified citation sets	2.3.1		75-150	LAM temp. file	Magnetic disk	Secret	
New citations	2.3.2		75-150	LAM temp. file	Magnetic disk	Secret	
Catalog Parameters	2.3.3		75-150	Library staff	Keyboard entry	Unclassified	
Command to display catalog input screen	2.4.1		50-100	Library staff	Keyboard entry	Unclassified	
Bibliographic data	2.4.2		50-100	Library staff	Keyboard entry	Secret	
Catalog input screen	02.4.1[b]		50-100	LAM system file	Magnetic disk	Unclassified	

[a] Reference numbers are taken from diagrams in Section 4.5, "Program Logic."

[b] All entries in this column refer to inputs, except those preceded by "0", which are outputs generated in a preceding process and used as inputs for the indicated process.

TABLE 4-2. LAM OUTPUT CHARACTERISTICS

FUNCTION/NAME OF OUTPUT	HIPO REF. NO.*	MEANS OF DISPLAY OR STORAGE	EXPECTED VOLUME OR FREQUENCY	SECURITY CLASSIF	USE OF OUTPUT
Reference					
Message requesting target data base	1.1.1	Screen display	75-150 per week	Unclassified	To formulate a search expression.
Message requesting parameter set chosen	1.1.2	Screen display	75-150 per week	Unclassified	
Message requesting parameter file chosen	1.1.3	Screen display	150-300 per week	Unclassified	
Search parameters	1.1.4	Magnetic disk	75-150 per week	Secret	To store search parameters until transmitted to the system by the user.
	1.1.5	Magnetic disk	75-150 per week	Secret	
	1.1.6	Magnetic disk	75-150 per week	Secret	
Search parameters	1.1.7	Magnetic disk	75-150 per week	Secret	
Search parameters	1.1.8	Magnetic disk	150-300 per week	Secret	
Search parameter display	1.2.1	Screen display	50-75 displays/week	Secret	To reformulate a search expression.
Revised search parameters	1.2.2	Magnetic disk	50-75 displays/week	Secret	
Formatted search expression	1.3.1	Magnetic disk	150-225 per week	Secret	To perform a search
Message indicating completed logon	1.3.2	Screen display	150-225 per week	Unclassified	
Transmitted search expression	1.3.3	Magnetic disk	150-225 per week	Secret	
Message indicating search results	1.3.4	Screen display	150-225 per week	Unclassified	
Retrieved citations	1.3.5	Magnetic disk	150-225 per week	Secret	
Downloaded citations	1.4.1	Magnetic disk	125-200 per week	Secret	To download and translate citations.
Translated citations	1.4.2	Magnetic disk	125-200 per week	Secret	
Retrieved citations	1.5.1	Screen display or hard copy	125-200 per week	Secret	To manipulate the results of a search
Combined sets of retrieved citations	1.5.2	Magnetic disk	50-75 sets per week	Secret	
Postprocessed citation sets	1.5.3	Magnetic disk	75-100 sets per week	Secret	
Retrieved citation sets	1.5.4	Magnetic disk	25-50 sets per week	Secret	
Stored search strategy	1.5.5	Magnetic disk	25-50 per week	Secret	
Cataloging					
Displayed citations	2.2.1	Screen display	50-75 citations/week	Secret	To modify retrieved citations.
Modified Citations	2.2.2	Magnetic disk	50-75 citations/week	Secret	
Citations submitted for local update	2.3.1	Magnetic disk	50-75 citations/week	Secret	To submit citations for catalog update.
Citations submitted to DTIC	2.3.2	Magnetic disk	25-50 citations/week	Secret	
Catalog input	2.4.2	Screen display	40-65 per week	Unclassified	To create new citations.
New citations	2.4.2	Magnetic disk	40-65 per week	Secret	

*Reference numbers are taken from diagrams in Section 4.5, "Program Logic."

Note on Priorities of Outputs. All outputs produced by retrieval processes are of high priority and all outputs produced by cataloging processes are of routine priority.

4.5 Program Logic

This section consists of descriptions of the processing steps to be implemented by the LAM. The descriptions include input-process-output figures, developed using the HIPO design method. Each of the following sections make reference to a set of charts and provides a brief description of the processing steps covered by the figures. Only the reference and cataloging functions are covered in this section. Circulation management and control is a function unique to the local system and must be handled by the commercial library software selected for the system.

4.5.1 Reference (1.0).

Figure 4-2 depicts the processes included in the reference function. Details of each process are discussed in the following sections.

4.5.1.1 Search Entry (1.1).

This section describes the processing steps depicted in Figure 4-3.

Input. Having accessed the reference function, the user chooses one of three modes (input 1.1.1) for entering search parameters:

1. A new search is created by entering search parameters via the keyboard at the user's terminal. The search parameters to be entered are the target data base (input 1.1.2), the terms (or data field values) to be searched (input 1.1.3), and the index keys (or data fields) to be searched (input 1.1.4). The target data bases include the local DNA catalog, the DTIC TR data base, and citation sets created by the user. The searchable index keys in the LAM data base are: DTL number (for technical reports), call number (for books), primary report number, secondary report number, MIPR number, origination date (report date), originating agency (corporate author), document classification, contract number, personal author, title of holding, primary requesting office, subject headings, and posting terms. When the search is performed, the index keys (input 1.1.4) in the chosen data base(s) (input 1.1.2) will be searched for the terms indicated (input 1.1.3).

2. A parameter set entered earlier in the current session (input 1.1.2) can be selected and used.

3. A user file of previously stored parameters (input 1.1.5) can be retrieved and used.

Search entry modes 2 or 3 (above) would generally be chosen when the user desires to revise previously entered parameter sets for use in the current search.

Processing Steps. The parameter set chosen is stored in a temporary file. Search parameters controlled by an authority file are edited against that file.

FIGURE 4.2. REFERENCE FUNCTION OVERVIEW

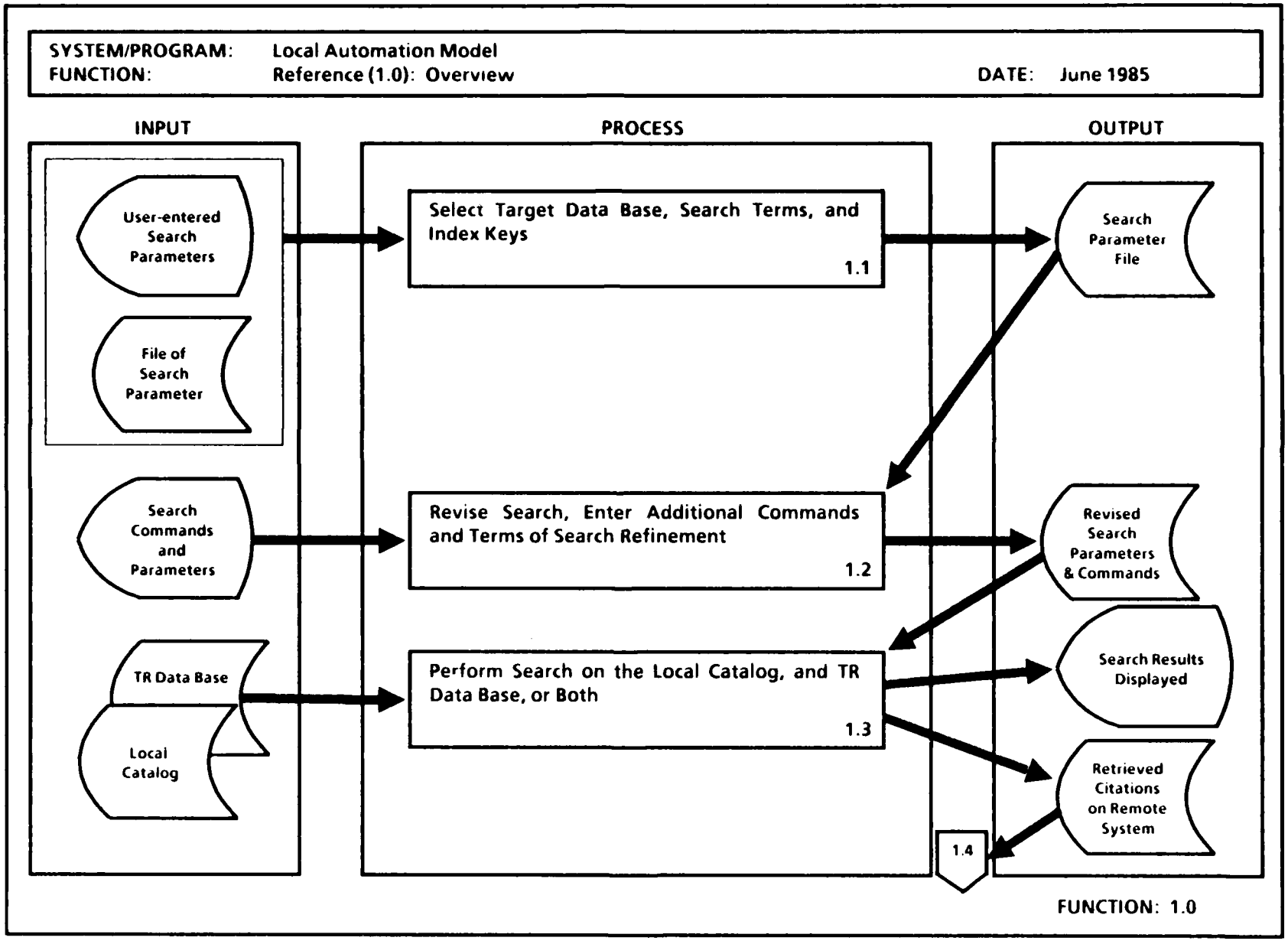


FIGURE 4-2. REFERENCE FUNCTION OVERVIEW (CONTINUED)

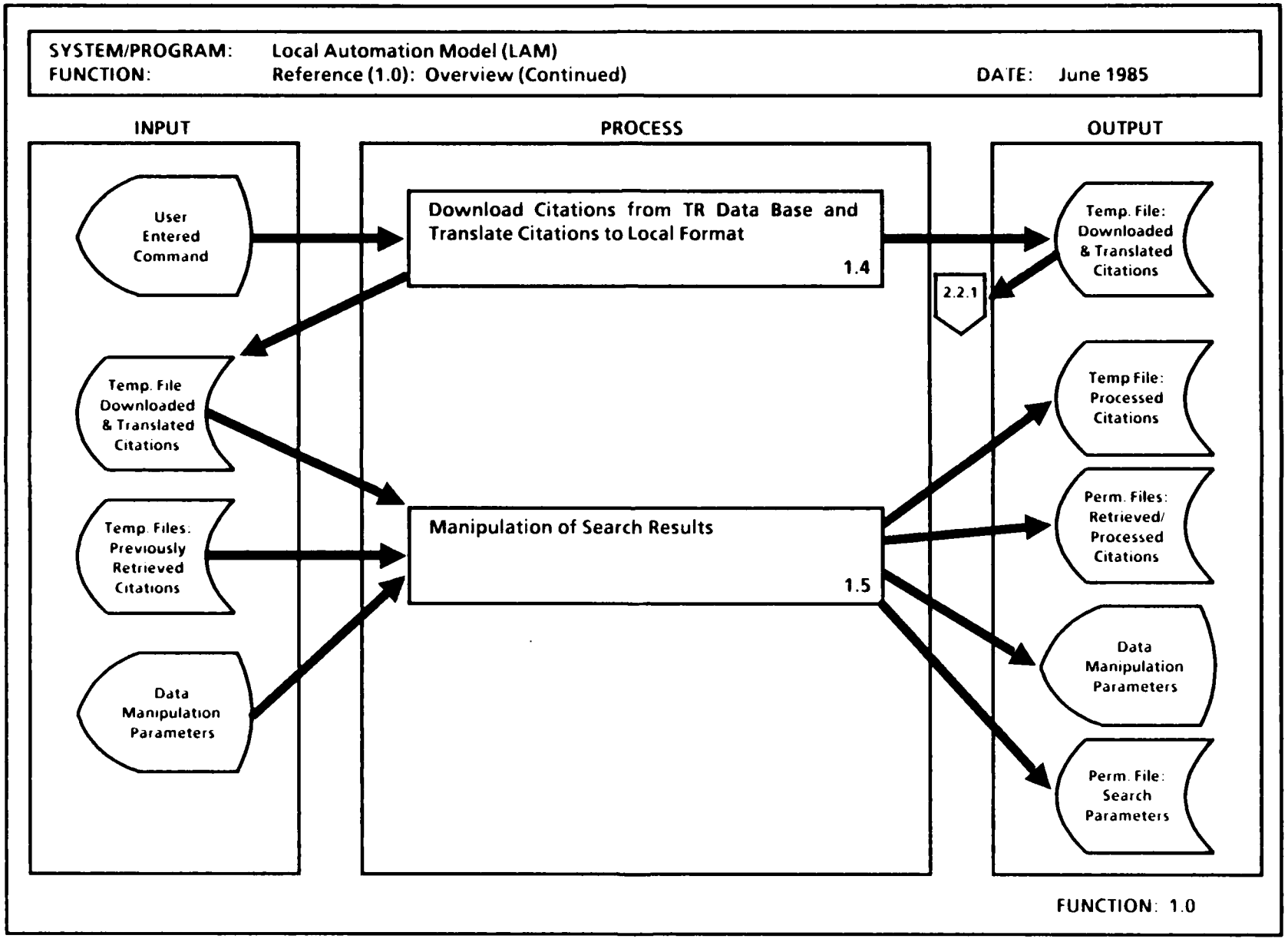


FIGURE 4-3. REFERENCE FUNCTION SEARCH ENTRY

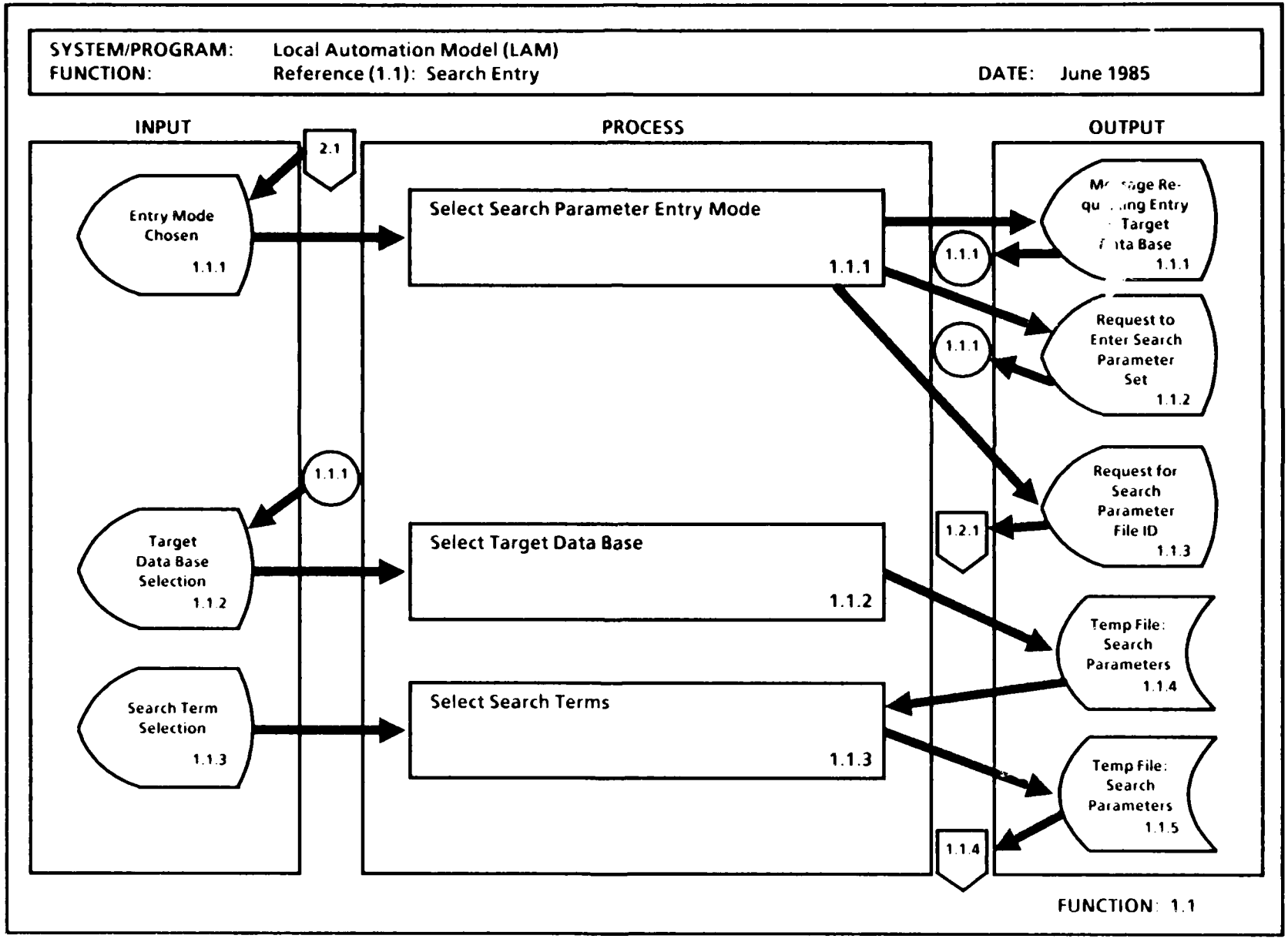
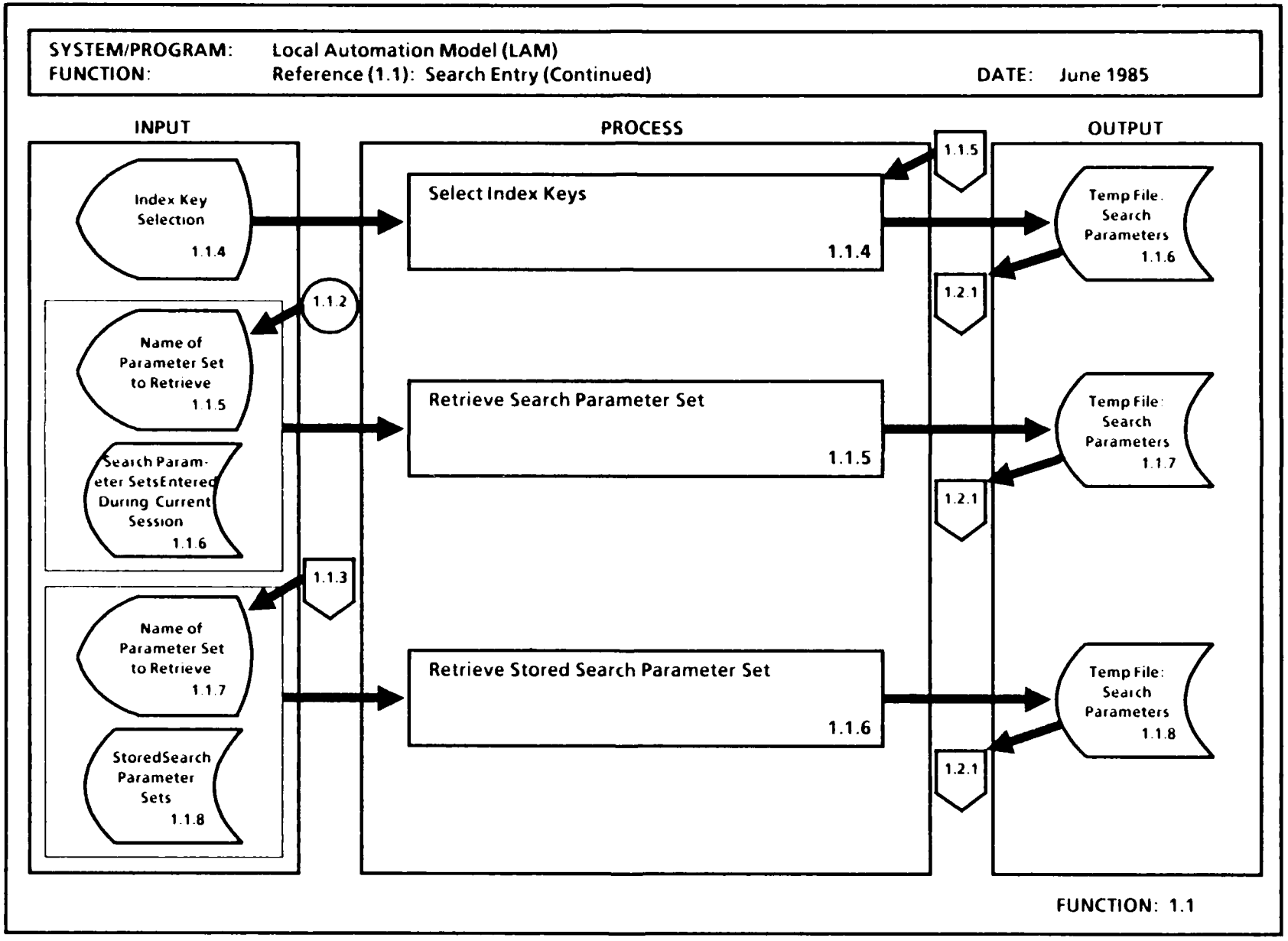


FIGURE 4-3. REFERENCE FUNCTION SEARCH ENTRY (CONTINUED)



Output. The file containing the parameters chosen is the output of this process.

Upon completion of the search entry, the user has the option of modifying the search (1.2) or running the search (1.3).

4.5.1.2 Modify Search (1.2).

This section describes the processing steps depicted in Figure 4-4.

Input. To revise the search parameters chosen, the user enters a command to initiate the "modify" process (input 1.2.2). The system responds by displaying the parameter set chosen (output 1.1.8 now used as input 1.2.1). The user then enters the revised parameters to be used for search refinement (input 1.2.3).

Processing Steps. The system displays the parameters that the user selected in the previous process (1.1) and stores the revised parameters that the user enters now.

Output. The output of this process is a file of revised search parameters.

4.5.1.3 Perform Search (1.3).

This section describes the processing steps depicted in Figure 4-5.

Input. When the target data base(s), search terms, and index keys have been selected, the user transmits the command for performing a search (inputs 1.3.1 and 1.3.2). The target data base(s) serve as inputs (inputs 1.3.3 and 1.3.4).

Processing Steps. The user-entered search command directs the system to translate the search parameters into the format(s) of the target data base(s) (output 1.3.1); dial and log onto the target data base(s); and indicate that the logon was successful (output 1.3.2). The system then transmits the search expression (output 1.3.3) to the target data base and the retrieval is performed.

Output. When the retrieval is complete, a message indicating the search results is displayed to the user (output 1.3.4) indicating the number of citations retrieved from each data base and stored in a temporary file(s) (output 1.3.5).

4.5.1.4 Download and Translate Citations (1.4)

This section describes the processing steps depicted in Figure 4-6.

FIGURE 4-4. REFERENCE FUNCTION MODIFY SEARCH

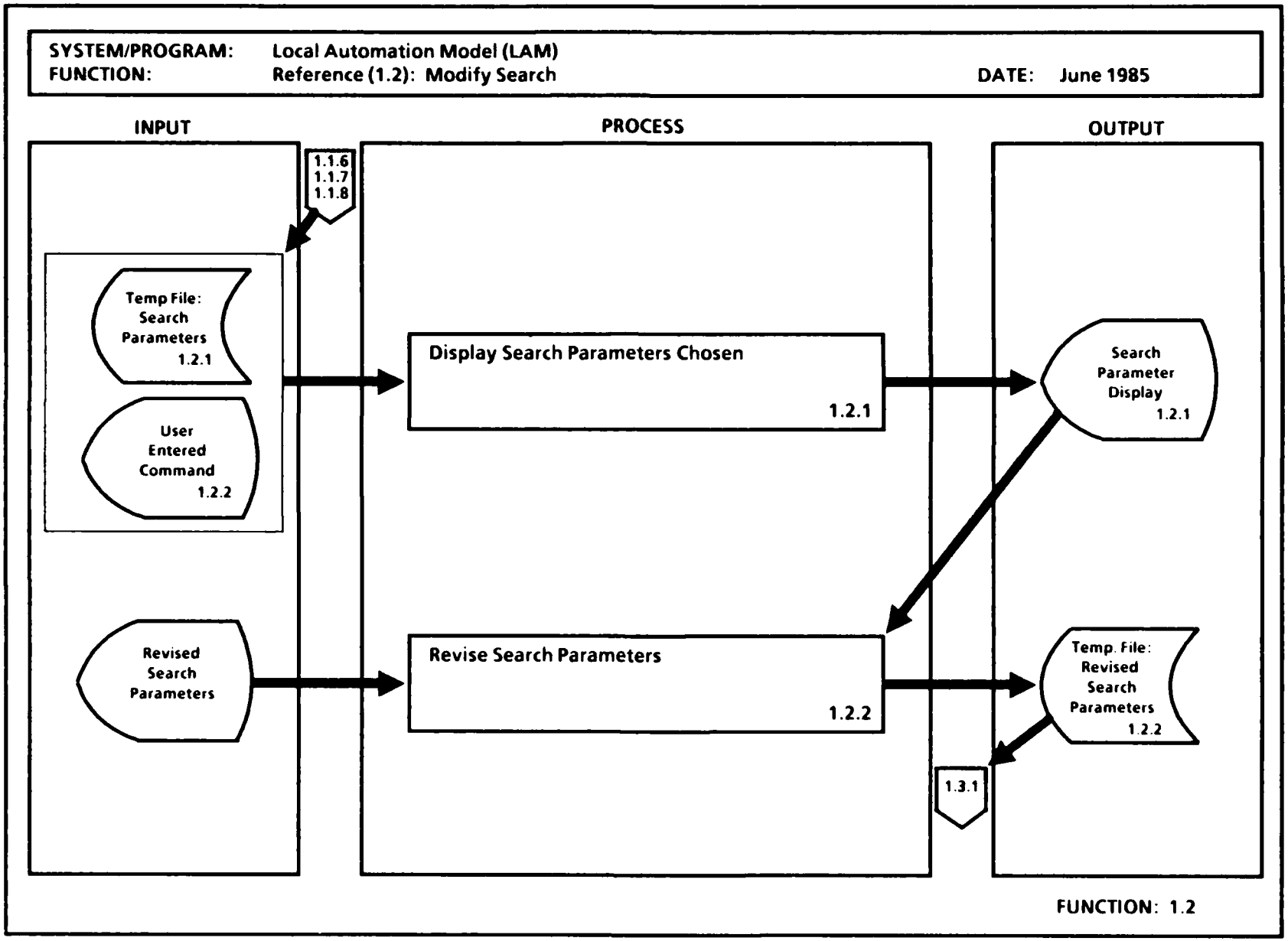


FIGURE 4-5. REFERENCE FUNCTION PERFORM SEARCH

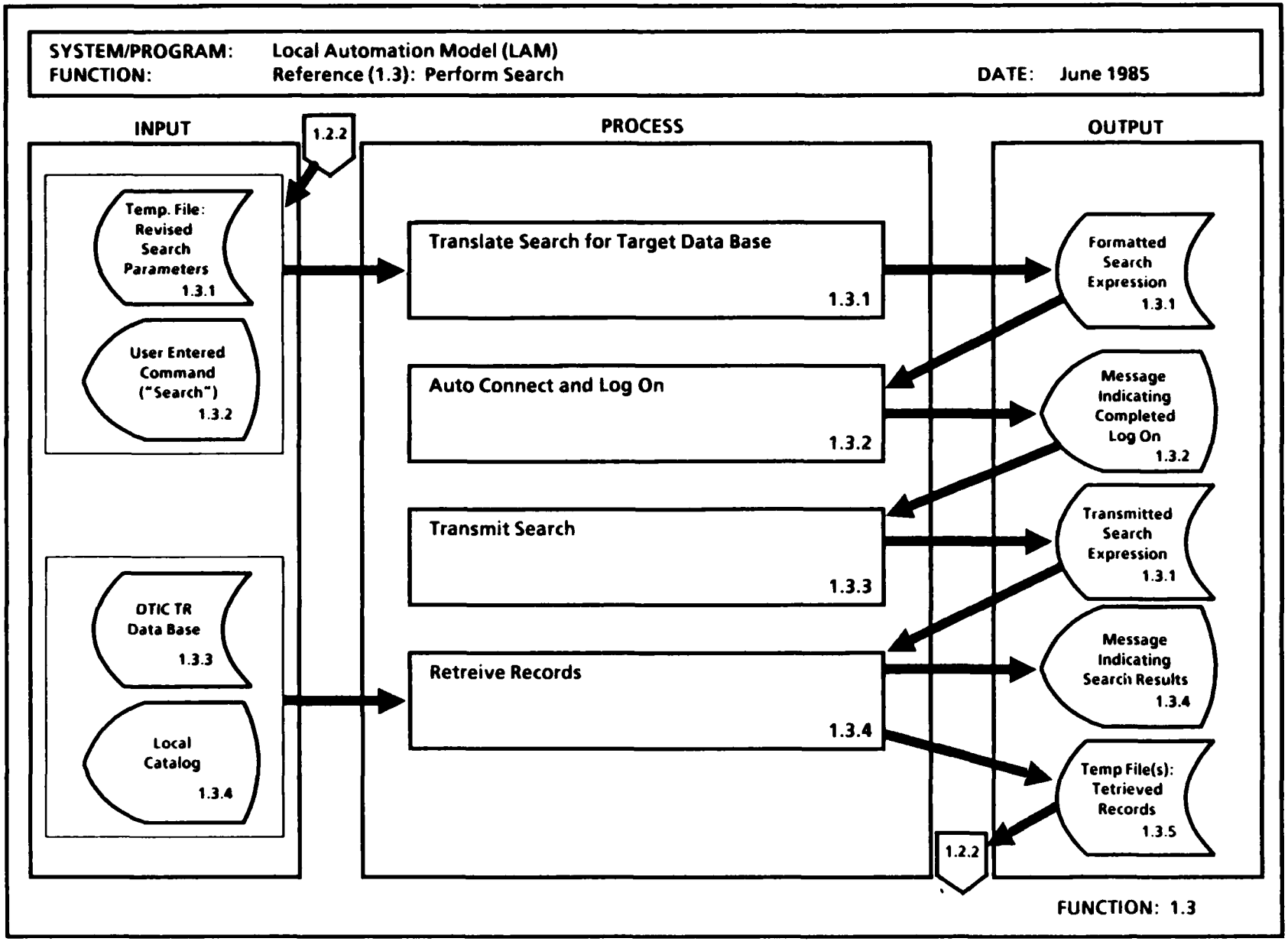
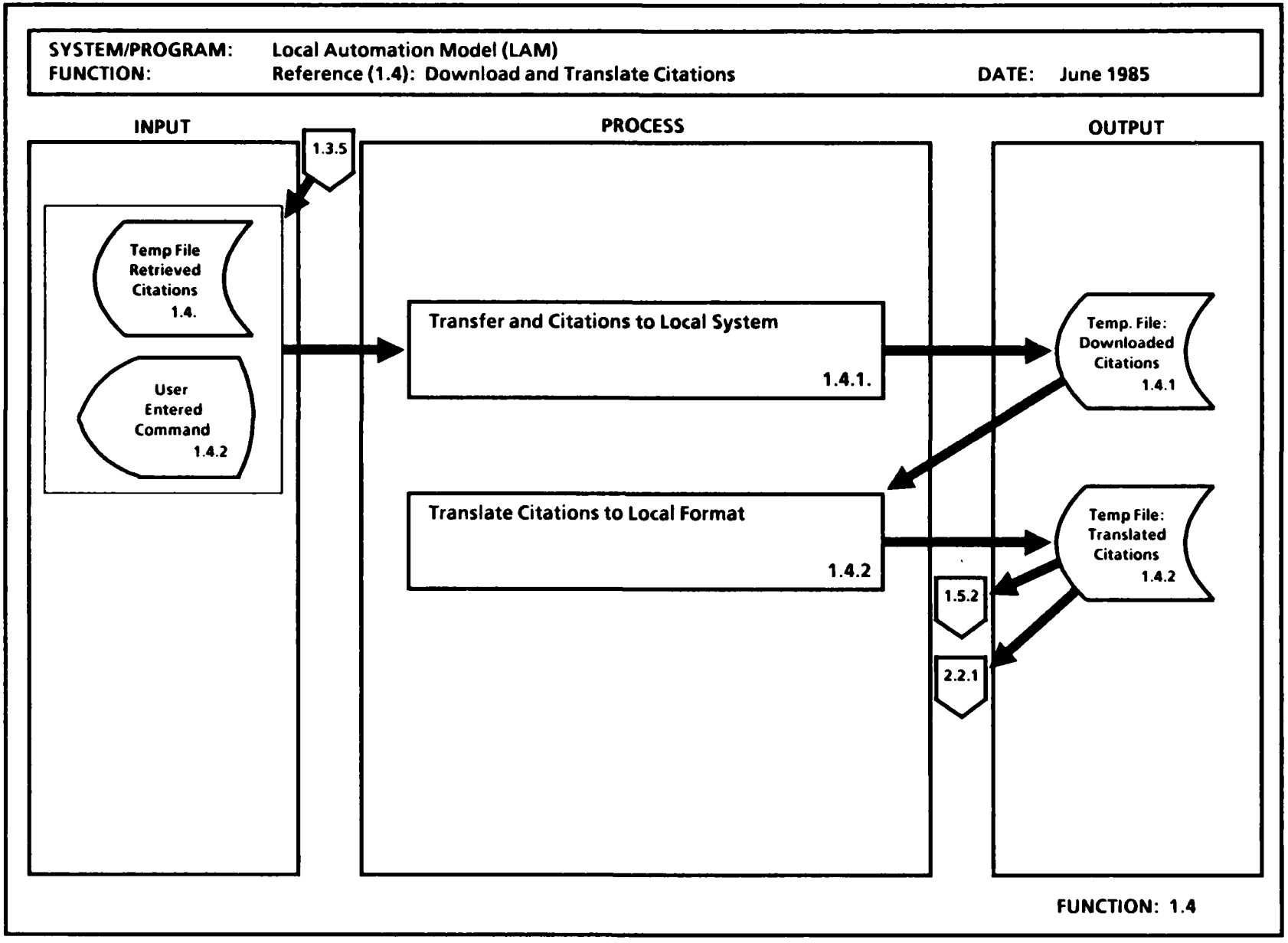


FIGURE 4-6. REFERENCE FUNCTION DOWNLOAD AND TRANSLATE CITATIONS



Input. When the search is completed, the user can either:

1. Download the retrieved citations to the local system and translate all retrieved citations to the local format. This is done by entering the download/translate command (input 1.4.2).

2. After seeing the number of hits from the previous search, the user may wish to return to process 1.1 to formulate a new search or revise a current or previous search.

Processing Steps. The system transfers the retrieved citations to the local system and translates the citations to the local format, or returns the user to process 1.1.

Output. The output of this process is a temporary file of translated citations on the local system.

4.5.1.5 Manipulation of Search Results (1.5).

This section describes the processing steps depicted in Figure 4-7.

Inputs. Several input options are now presented to the user:

1. Retrieved citations can be viewed or printed by entering the appropriate parameters (input 1.5.1). Parameters could include retrieval set and record numbers to be displayed, and display format to be used.

2. Search sets can be merged by entering the appropriate parameters, such as set number and relational operator (and, or, etc.) (input 1.5.3).

3. Retrieved citation sets can be postprocessed by indicating the search set to be processed and the appropriate postprocessing command (input 1.5). Postprocessing capabilities include sorting of retrieved citations sets and deletion of selected citations.

4. Retrieved citations can be stored permanently by entering the appropriate command and parameters, such as retrieval set number (input 1.5.7).

5. A search strategy can be saved by entering the appropriate command and parameters (such as strategy number) (input 1.5.7)

Processing Steps. The five processing steps corresponding to the input options listed above run independently of each other and can be performed individually or in any order chosen by the user.

Output. The outputs produced by this process are as follows:

1. Retrieved citations displayed on the user's screen or printed in hardcopy (output 1.5.1)

2. A temporary file of combined search sets (output 1.5.2)

3. A temporary file of postprocessed citations (output 1.5.3)

4. A permanent file of retrieved citations (output 1.5.4)

FIGURE 4-7. REFERENCE FUNCTION MANIPULATION OF SEARCH RESULTS

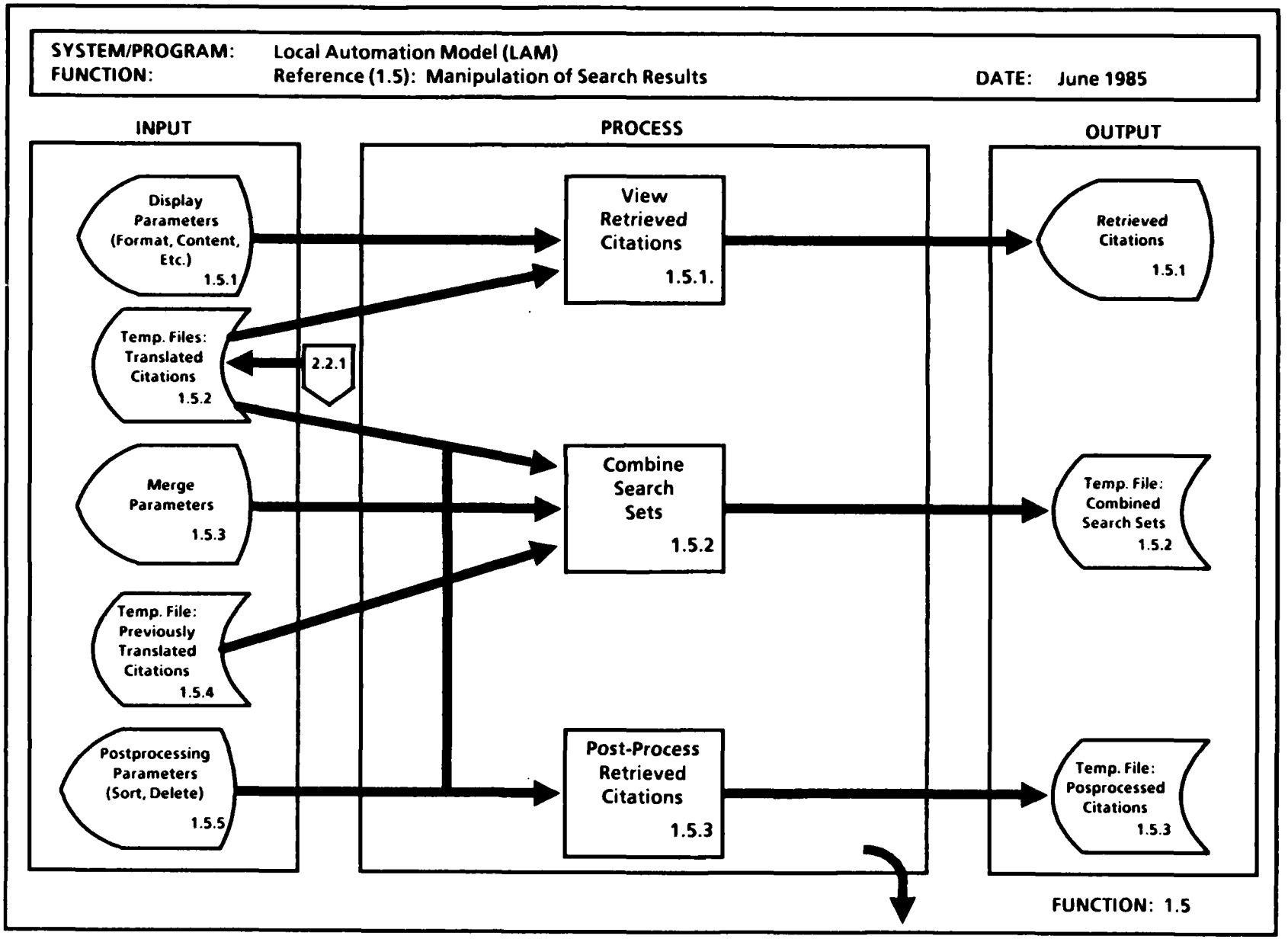
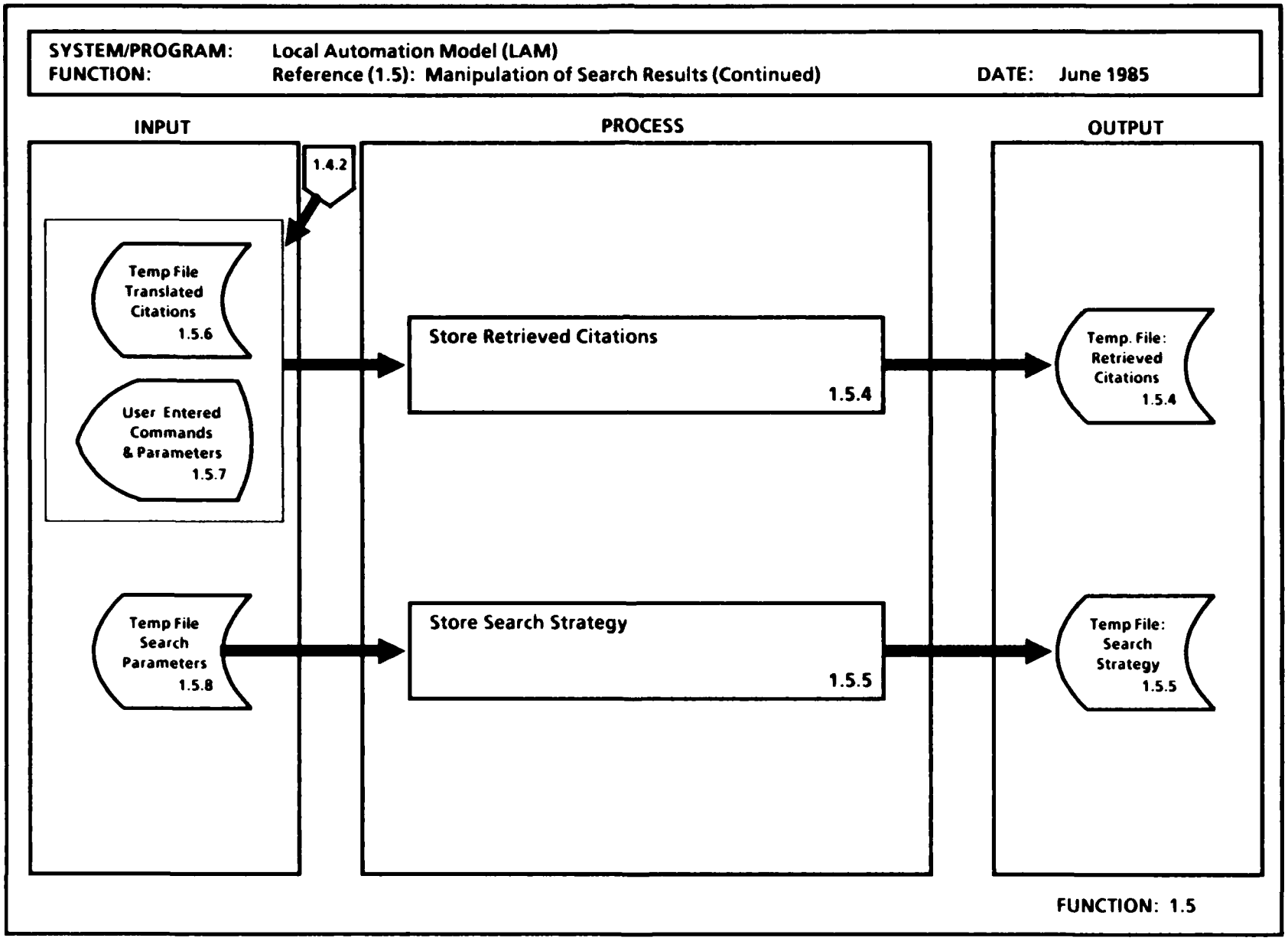


FIGURE 4-7. REFERENCE FUNCTION MANIPULATION OF SEARCH RESULTS (CONTINUED)



5 A permanent file of one or more search strategies (output 1.5.5).

4.5.2 Cataloging (2.0).

Figure 4-8 depicts the process for the cataloging function. Detailed charts for each process are discussed in the following sections.

4.5.2.1 Perform Duplicate Check Search (2.1)

Input. Upon accessing the cataloging function, the user enters a command to perform a duplicate search or to enter a new bibliographic citation.

Processing Steps. If the user chooses to perform a search for duplicate citations, the system will access the reference function to prompt the user for entry of search parameters (process 1.1); otherwise, the user will remain in the cataloging function and be prompted for the creation of new bibliographic citations (process 2.4).

Output. As a result of this process, the user gains access to either process 1.1 for a duplicate citation search or process 2.4 to create new citations.

4.5.2.2 Modify Retrieved Citations (2.2).

This section describes the processing steps depicted in Figure 4-9. This process is performed only after a successful duplicate search; that is, one in which a citation for the holding being cataloged is found and retrieved. The retrieved citation is now modified for submission to another catalog.

Input. Inputs used in this process are the citations retrieved in the duplicate search (output 1.4.2 used as input 2.2.1) and the bibliographic data entered by the user from a terminal (input 2.2.2).

Processing Steps. The user first views a retrieved citation on the terminal screen, then modifies the citation by adding bibliographic data required for submitting the record to another catalog. (Generally, if a citation from the TR data base has been retrieved for modification, data required for the DNA catalog will be added; if a DNA record has been retrieved for modification, DTIC-specific data will be added.)

FIGURE 4-8. CATALOGING OVERVIEW

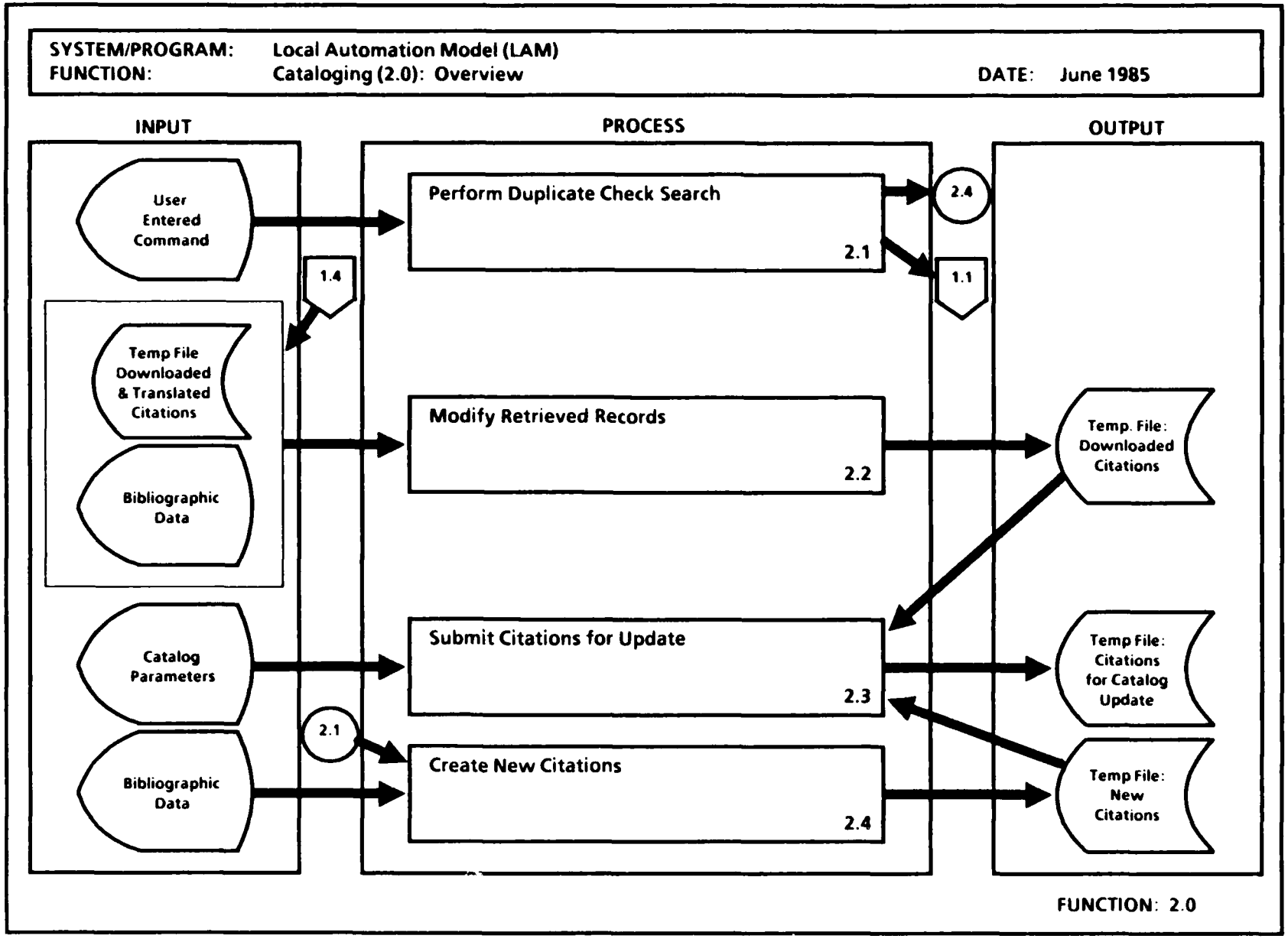
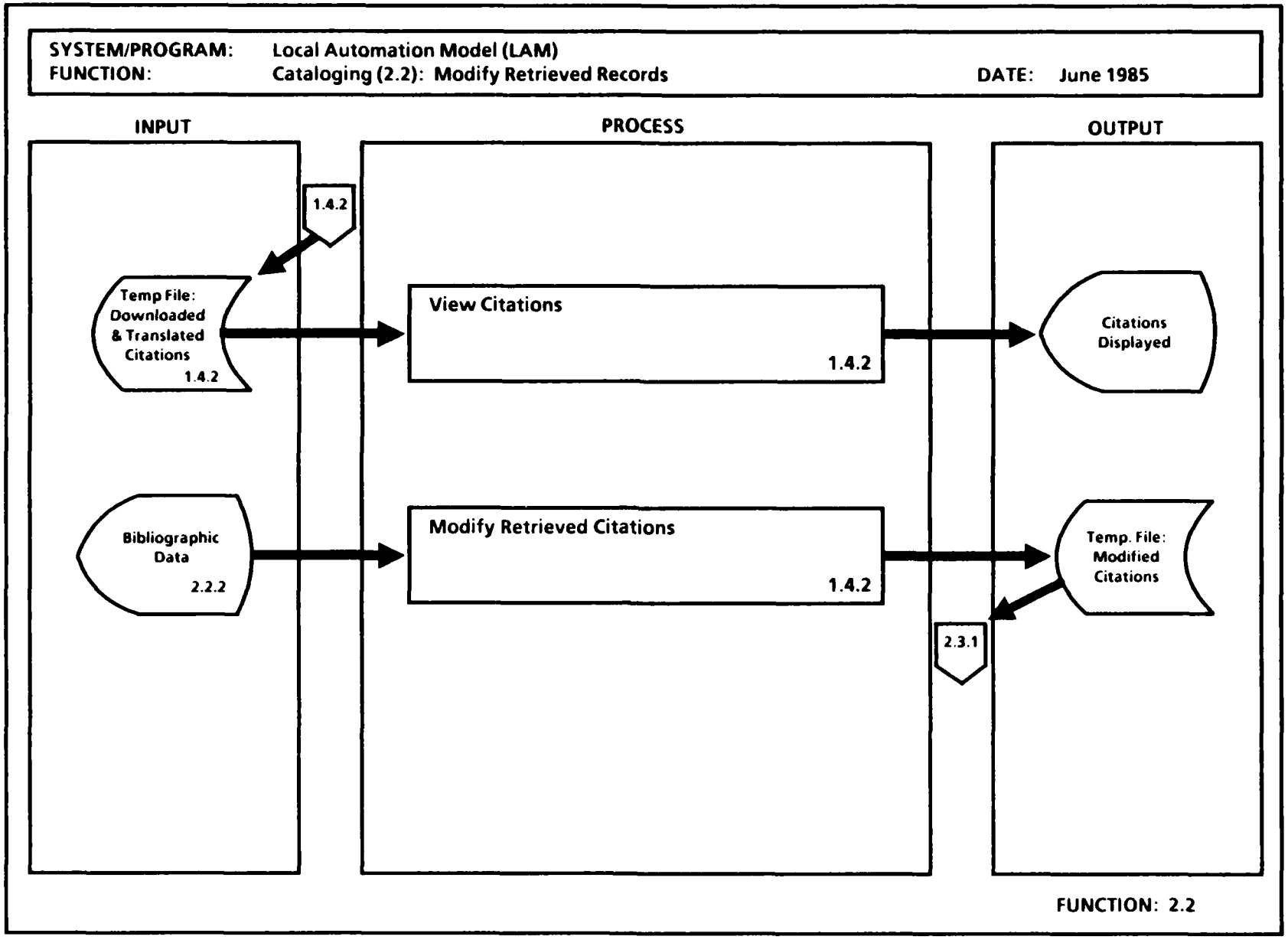


FIGURE 4-9. CATALOGING MODIFY RETRIEVED RECORDS



Output. The output of this process is a file of citations modified to conform to a new catalog format (output 2.2.2).

4.5.2.3 Submit Citations for Catalog Update (2.3).

This section describes the processing steps depicted in Figure 4-10.

Input. The inputs for this process are the files of modified citations (output 2.2.2) and new citations (2.4.2) that are ready for catalog update and user-entered commands and parameters directing the files to the proper catalog.

Processing Steps. The processing consists of submitting the files of modified and newly created records for catalog update. When submitting citations to the DROLS, the update itself is performed as a separate process by DTIC computer personnel; citations submitted to the local file are stored until the next catalog update, which is performed as a separate process.

Output. The outputs of this process are files of citations transmitted to the TR data base, to the local system, or to both systems for the next update.

4.5.2.4 Create New Citations (2.4).

This section describes the processing steps depicted in Figure 4-11.

Input. Inputs to this process are user-entered commands to display the appropriate catalog input screens (input 2.4.1) and bibliographic data used to construct new bibliographic citations (input 2.4.2).

Processing Steps. The user displays the catalog-input screen and uses it to enter bibliographic data for the construction of new citations.

Output. The output of this process is a temporary file of new bibliographic citations.

FIGURE 4-10. CATALOGING SUBMIT CITATIONS FOR CATALOG UPDATE

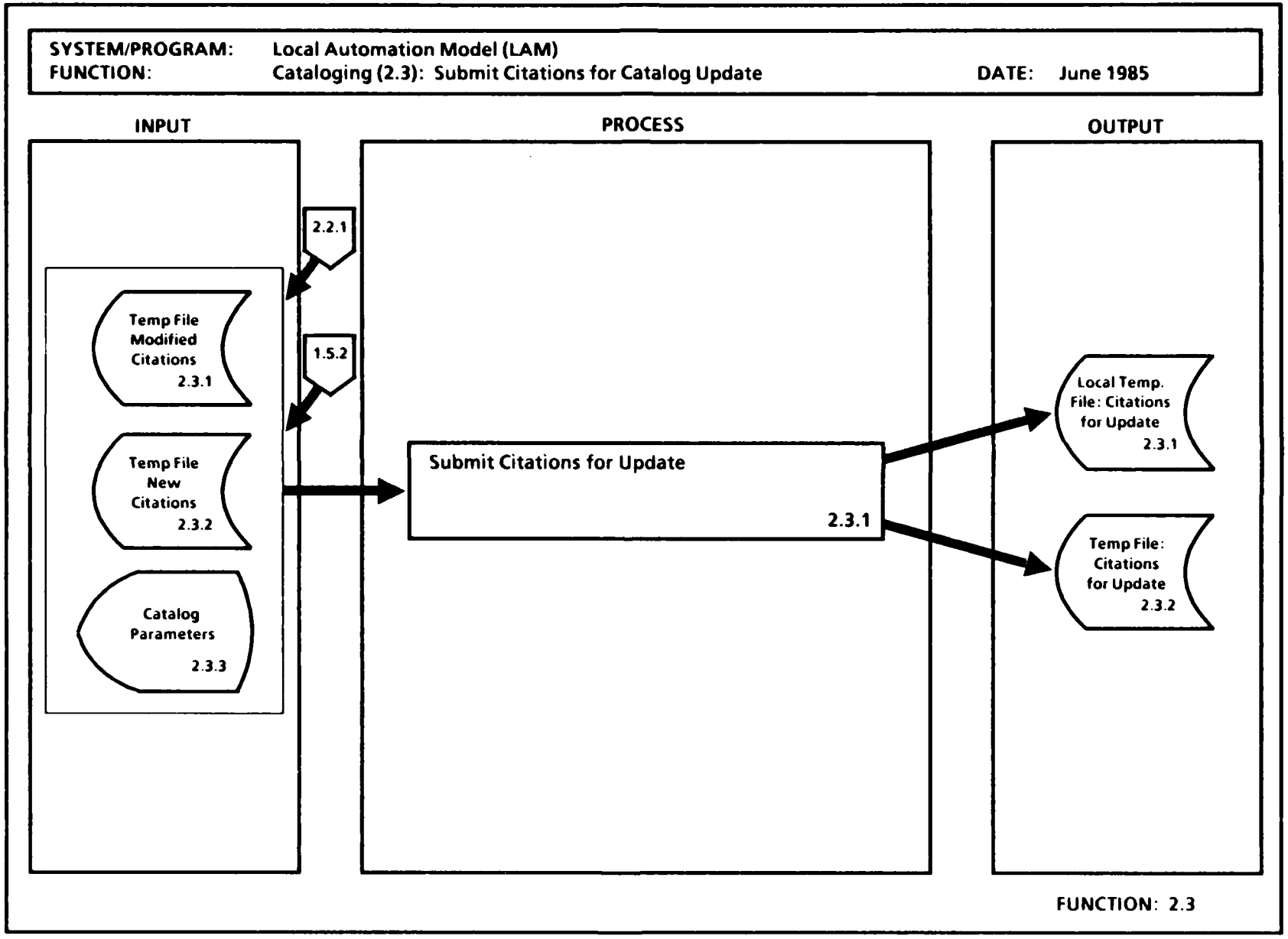
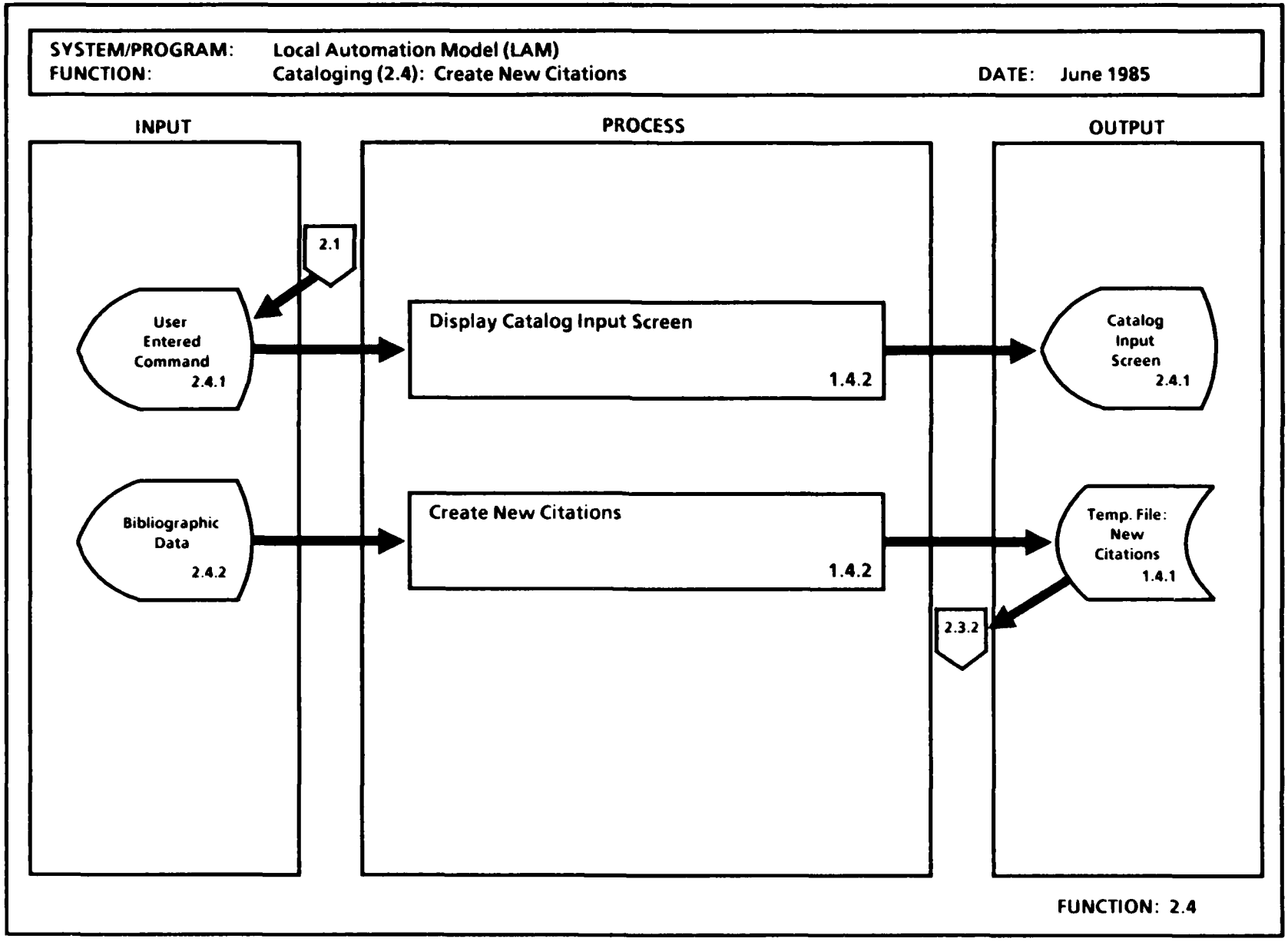


FIGURE 4-11. CATALOGING CREATE NEW CITATIONS



APPENDIX A

LOCAL AUTOMATION MODEL DATA ELEMENTS BY INPUT

The data elements that make up each Local Automation Model (LAM) input are provided in this appendix. The inputs are listed by Hierarchy-Input-Process-Output (HIPO) reference number as they appear in Figures 4-2 through 4-7. An "X" under the reference number indicates that the data element is included as part of the input. A description of each input is provided in Table 4-1, a description of each data element is provided in Appendix B.

KEY TO SYMBOLS

T = TR data base element
L = Local DNA data element
B = Data element in both data bases/catalogs
S = Data generated by the LAM software

NOTE: The following inputs are not included in the table because they consist entirely of user-entered commands or menu options: 1.1.1, 1.1.2, 1.1.5, 1.1.7, 01.1.4, 1.2.2, 1.3.2, 1.4.2, 1.5.1, 1.5.3, 1.5.5, 1.5.7, 2.1, 2.3.3, 2.4.1.

The following list contains the terms, acronyms, and abbreviations used in this appendix:

- DNA: Defense Nuclear Agency
- DTL: DNA Technical Library
- HIPO: Hierarchy-Input-Process-Output -- a structured system design methodology documenting logical flow through use of input-process-output charts
- ISCM: Intelligence Security Classification Management
- LAM: Local Automation Model
- MIPR: Military Interdepartmental Purchase Request
- RDT&E: Research, Development, Test and Evaluation
- SBIN: Shared Bibliographic Input System

- TR data base: The Technical Reports data base operated and maintained by DTIC containing over 1.5 million citations to reports published or sponsored by DoD.

TABLE A-1. LAM DATA ELEMENTS BY INPUT

ELEM. NO.	ELEMENT NAME	INPUT NUMBER*																									
		1.1.3	1.1.4	1.1.6	1.1.8	01.1.5	1.2.1	1.2.3	01.2.1	1.3.1	1.3.3	1.3.4	01.3.1	01.3.3	1.4.1	1.5.2	1.5.4	1.5.6	1.5.8	2.2.1	2.2.2	02.2.1	2.3.1	2.3.2	2.4.2	02.4.1
1	DTL Number		L	L	S		S	S	S	S		L	S	S	L	S	S	S	S	S	S	S	S	S	S	S	S
2	Call Number		L	L	A		A	A	A	A		L	A	A	L	A	A	A	A	A	A	A	A	A	A	A	A
3	Type of Holding				M		M	M	M	M		L	M	M	L	M	M	M	M	M	M	M	M	M	M	M	M
4	Status Code				E		E	E	E	E		L	E	E	L	E	E	E	E	E	E	E	E	E	E	E	E
5	Date Coded											L			L												
6	Primary Report Number		B	B	A		A	A	A	A	T	L	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A
7	Secondary Report Number		L	L	S		S	S	S	S		L	S	S	L	S	S	S	S	S	S	S	S	S	S	S	S
8	DTIC Accession (AD) Number										T	L			B												
9	MIPR Number		L	L	1.		1.	1.	1.	1.		L	1.	1.	L	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
10	Origination Date		B	B	1.		1.	1.	1.	1.	T	L	1.	1.	B	4.	4.	4.	1.	4.	4.	4.	4.	4.	4.	4.	4.
11	Originating Agency		L	L	6		6	6	6	6	T	L	6	6	B	1	1	1	6	1	1	1	1	1	1	1	1
12	Security Control Number											L			L												
13	CNWDI										T	L			B												
14	Handling										T	L			B												
15	Restricted Data										T	L			B												
16	Document Classification		L	L							T	L			B												
17	Downgrade Date											L			L												
18	Page/Leaf Count										T	L			B												
19	Contract Number		T	T							T	L			B												
20	Weeds: Category											L			L												
21	Weeds: Retention Cycle											L			L												
22	Weeds: Office Symbol											L			L												
23	Scope Notes										T	L			B												
24	Subtask Number											L			L												
25	Copy/Series Number											L			L												
26	Copy/Series Deletion Date											L			L												
27	Microfiche Copy Number											L			L												
28	Microfiche Copy Deletion Date											L			L												
29	Personal Author		B	B							T	L			B												
30	Title		B	B							T	L			B												
31	Title Classification										T	L			B												
32	Deletion Message											L			L												

*Input number are taken from figures in Section 4.5

TABLE A-1. LAM DATA ELEMENTS BY INPUT (CONTINUED)

ELEM. NO.	ELEMENT NAME	1.1.3	1.1.4	1.1.6	1.1.8	01.1.5	1.2.1	1.2.3	01.2.1	1.3.1	1.3.3	1.3.4	01.3.1	01.3.3	1.4.1	1.5.2	1.5.4	1.5.6	1.5.8	2.2.1	2.2.2	02.2.1	2.3.1	2.3.2	2.4.2	02.4.1
33	Record Classification		B	B							T	L			B										
34	Name											L			L										
35	Need to Know											L			L										
36	Agency/Address											L			L										
37	Circulation Date											L			L										
38	Due Date											L			L										
39	Return Date											L			L										
40	Operation Name											L			L										
41	ISCM											L			L										
42	Processing Date											L			L										
43	Processing Status											L			L										
44	DNA Accession Number											L			L										
45	Place of Publication											L			L										
46	Volume Number											L			L										
47	Issue Number											L			L										
48	Primary Requesting Office		L	L								L			L										
49	Recipients											L			L										
50	Frequency											L			L										
51	Subject Headings		B	B							T	L			B										
52	Security Classification of Subject Headings										T	L			B										
53	Posting Terms/Descriptors		L	L							T	L			B										
54	Security Classification of Posting Terms										T	L			B										
55	Price of Item											L			L										
56	Postage & Handling Cost											L			L										
57	Total Cost											L			L										
58	Total Cumulative Expenditure											L			L										
59	Publisher's Address											L			L										
60	Publisher Point of Contact											L			L										
61	Point of Contact Phone No.											L			L										
62	Date Ordered											L			L										
63	Reclassification Date											L			L										

*Input number are taken from figures in Section 4.5.

TABLE A-1. LAM DATA ELEMENTS BY INPUT (CONTINUED)

ELEM. NO.	ELEMENT NAME	1.1.3	1.1.4	1.1.6	1.1.8	01.1.5	1.2.1	1.2.3	01.2.1	1.3.1	1.3.3	1.3.4	01.3.1	01.3.3	1.4.1	1.5.2	1.5.4	1.5.6	1.5.8	2.2.1	2.2.2	02.2.1	2.3.1	2.3.2	2.4.2	02.4.1
64	Subject Fields and Groups										T				T										
65	Descriptive Note										T				T										
66	RDT&E Project Number		T	T							T				T										
67	SBIN Distribution/ Availability										T				T										
68	RDT&E Task Number		T	T							T				T										
69	RDT&E Work Unit Number										T				T										
70	Monitoring Agency Acronym		T	T							T				T										
71	Monitoring Agency Series Number		T	T							T				T										
72	Abstract										T				T										
73	Abstract Classification										T				T										
74	Regrade Date										T				T										
75	Annotation/Index Annotation										T				T										
76	Serial Code/Source Series		T	T							T				T										
77	Corporate Author Code										T				T										
78	Classification Authority										T				T										
79	Declassification Date/Event										T				T										
80	Downgrade Date/Event										T				T										
81	Extension Authority										T				T										
82	Review Date										T				T										
83	Reason for Extension										T				T										
84	SBIN Holding Symbol		T	T							T				T										
85	Data Base Name (or Code)														S										
	User-Selected Parameters																								
	Data Base Selection			X		X																			
	Parameter Set Selection																								
	Search Term Selection	X		X		X																			

*Input number are taken from figures in Section 4.5.

APPENDIX B

DATA ELEMENTS FOR THE DEFENSE NUCLEAR AGENCY LOCAL AUTOMATION MODEL

The data elements identified for inclusion in the Local Automation Model (LAM) data base at the Defense Nuclear Agency (DNA) are listed and described in this appendix. The data category, DNA and Defense Technical Information Center (DTIC) element formats, DTIC field number, required fields, number of occurrences, edit criteria, and comments are given for each element. As noted earlier, some elements will be stored in both the local and the Technical Reports (TR) data bases, and other elements will be stored in only one of the two bases. Entries in the columns headed "DNA Format" and "DTIC Format" indicate the data base(s) in which each element will be stored.

KEY TO DATA CATEGORIES

C = Catalog/bibliographic data
P = Patron/circulation data
A = Acquisition/budget data

KEY TO FORMAT TYPES

N = Numeric characters only (0-9)
A = Alphabetic characters only (A-Z)
A/N = Alphabetic, numeric, and special characters
A/NN = Alphabetic and numeric characters but no special characters

The following list contains the terms, acronyms, and abbreviations used in this appendix:

- CNWDI: Critical Nuclear Weapons Design Information
- DNA: Defense Nuclear Agency
- DRIT: DTIC Retrieval and Indexing Terminology
- DTIC: Defense Technical Information Center
- DTL: DNA Technical Library
- ISCM: Intelligence Security Classification Management

- LAM: Local Automation Model
- MIPR: Military Interdepartmental Purchase Request
- NTIS: Nuclear Test Personnel Review
- NTPR: National Technical Information Center
- RDT&E: Research, Development, Test, and Evaluation
- SBIN: Shared Bibliographic Input System
- SDI: Selected Dissemination of Information
- TR data base: The Technical Reports data base operated and maintained by DTIC containing over 1.5 million citations to reports published or sponsored by DoD.

TABLE B-1. DATA ELEMENTS FOR THE DNA LOCAL AUTOMATION MODEL

ELEM. NO.	ELEMENT NAME	DATA CATE-GORY	DNA FORMAT TYPE	DNA FORMAT LEN.	DTIC FORMAT TYPE	DTIC FORMAT LEN.	DTIC FLD. NO.	REQUIRED FIELDS DNA	REQUIRED FIELDS DTIC	NUMBER OF OCCURRENCES	EDIT CRITERIA	DESCRIPTION/COMMENTS
1	DTL Number	C,P,A	A/N	25			N/A	Yes		1/Holding	None	DNA Technical Library (DTL) Number
2	Call Number	C,P,A	A/N	20			N/A	Yes		1/Holding	None	Used for books and serials only.
3	Type of Holding	C,P,A	A	1			N/A	Yes		1/Holding	None	Indicates report, book, serial,other.
4	Status Code	C,P,A	A/N	1			N/A	Yes		1/Holding	None	Indicates status of holding: shelved, on loan, missing, etc.
5	Date Coded	A	N	6			N/A			1/Holding	None	Date holding was input into system.
6	Primary Report Number	C,P,A	A/N	25	A/N	35	#14	Yes		1/Holding	None	Originating Report Number Source Series/Report Number (DTIC element name)
7	Secondary Report Number	C,P	A/N	25			N/A			1/Holding	None	
8	DTIC Accession Number	C	A/N	12	A/NN	9	#1		Yes	1/Holding	First two characters must be "AD"; third character must be alphabetic; next six must be numeric.	Includes 2 subfields: 7-character AD number and 5-character AD number.
9	MIPR Number	C	A/N	6			N/A			1/Holding	Must be all blank or all numeric; positions 3 or 4 may be a hyphen.	Military Interdepartmental Purchase Request (MIPR)
10	Origination Date	C,P	N	6	A/N	7	#11		Yes	1/Holding	None	Date of document/date of publication/ Report Date (DTIC element name)
11	Originating Agency	C,P	A/N	50	N	6	#35	Yes		1-3/Holding	An entry in this field is required when "Author" is blank.	Corporate Author (for reports) or Publisher (for books)
12	Security Control Number	C	N	7			N/A			1/Holding	None	
13	CNWDI	C	A	2	A A	1 1	#22 #31			1/Holding	None	Critical Nuclear Weapons Design Information
14	Handling	C	A/N	1	A/N A/N	1 1	#22 #33			1/Holding	None	Publicly releasable or limited distribution
15	Restricted Data	C	A	1	A/N A	1 1	#22 #33			1/Holding	None	Includes Formerly Restricted Data

TABLE B-1. DATA ELEMENTS FOR THE DNA LOCAL AUTOMATION MODEL (CONTINUED)

16	Document Classification	C,P	A	6	A	1	#20	Yes	Yes	1/Holding	Must have value of S,C, or U.	Report Classification (DTIC element name)
17	Downgrade Code	C	N	1			N/A			1/Holding	None	
18	Page/Leaf Count	C	N	4	A/N	4	#12			1/Holding	None	Pagination (DTIC element name)
19	Contract Number	C	A/N	29	A/N	35	#15			1-2/Holding	None	Contract or Grant Number (DTIC element name)
20	Meals:Category	C	N	1			N/A			1/Holding	Must be blank or have a value of 1,2,3,or 4	Indicates DNA Report, DNA Funded Report or other report
21	Meals:Retention Cycle	C	N	2			N/A			1/Holding	None	Indicates time period to retain document
22	Meals:Office Symbol	C	A	5			N/A			1/Holding	None	Office symbol of responsible office
23	Scope Notes	C	A/N	12	A/N A/N	120 600	#9 #21			1/Holding	None	Includes series name & number for books(DNA)/ Descriptive Note (DTIC Element #9) Supplementary Note (DTIC Element #21)
24	Subtask Number	C	A/N	11			N/A			1/Holding	None	
25	Copy/Series Number	C,P	A/N	6						1-A/Holding	This field or field #27 must not be blank	Copy number
26	Copy/Series Deletion Date	C	N	6			N/A			1-A/Holding	None	
27	Microfiche Copy Number	C,P	A/N	6			N/A			1-A/Holding	This field or field #27 must not be blank	
28	Microfiche Copy Deletion Date	C	A/N	6			N/A			1-A/Holding	None	
29	Author	C,P,A	A/N	20	A/N	60	#10	Yes		1-3/Holding	An entry is required if "Originating Agency" is blank	Personal Author (DTIC element name)
30	Title	C,P,A	A/N	60	A/N A/N	450 450	#6 #7	Yes		1-A/Holding	None	DTIC Field #6 is Unclassified Title DTIC Field #7 is Classified Title
31	Title Classification	C,P,A	A	1	A	1	#8	Yes		1/Holding	Must be U,R,C, or S (DTIC) If DTIC Field #7 has an entry, "U" is not permitted	
32	Deletion Message	C	A/N	60			N/A			1/Holding	None	
33	Record Classification	C,P,A	A	1	A	1	#3	Yes	Yes	1/Record	Must have a value of U,FUUO,C, (SFUO),CUO,S,SFUO,SFUUCN,SUO,SNUNC	Entry Classification or Card Catalog Classification (DTIC element name)
34	Name	P	A/N	25			N/A			1/Record	None	Name of Patron
35	Need to Know	P	A/N	50			N/A			1-50/Record	None	Subjects for which a patron has access to library holdings

TABLE B-1. DATA ELEMENTS FOR THE DNA LOCAL AUTOMATION MODEL (CONTINUED)

36	Agency/Address	P	A/N	100			N/A			1/Record	None	Patron's Agency and Address
37	Circulation Date	P	N	6			N/A			1/Holding	None	Date on which holding was checked out
38	Due Date	P	N	6			N/A			1/Holding	None	Date on which holding is due to be returned
39	Return Date	P	N	6			N/A			1/Holding	None	Date on which holding was returned to library
40	Operation Num	C	A/N	15			N/A			1-15/Holding	None	Name of operation in which test was performed (NTPR records only)
41	ISSM	C	A/N	4			N/A			1/Holding	None	Intelligence/Security Classification Management Management (NTPR records only)
42	Processing Date	C	N	6						1/Holding	None	Date available at NTIS
43	Processing Status	C	A/N	1			N/A			1/Holding	None	In-process, Determined to be releasable, or releasable
44	DNA Accession Number	C,P	N	7			N/A			1/Holding	Must be numeric; third digit must be a dash.	Serials only?
45	Place of Publication	C,A	A/N				N/A			1/Holding	None	Books and Serials Only
46	Volume Number	C,P,A	A/N	5			N/A			1/Holding	None	
47	Issue Number	C,P,A	A/N	7			N/A			1/Holding	None	
48	Primary Requesting Office	C,A	A/N	50			N/A			1/Holding	None	Subscriber (serials)/Requestor (acquisitions)
49	Recipients	C	A/N	25			N/A			1-20/Holding	None	Recipients of serials (SDI/routing)
50	Frequency	C	A/N	5			N/A			1/Holding	None	Serials Only
51	Subject Headings	C	A/N	50	A/N	50	#25			1-20/Holding	Matched against local authority file.	Posting Terms(Identifiers)/Open-ended Terms/ SKDN Terms (DTIC element name)
52	Security Classification of Subject Headings	C	A	1	A/N	1	#24	Yes		1-20/Holding	Must have a value of S,C,R, or U.	
53	Posting Terms/Descriptors	C	A/N	50	A/N	50	#23		Yes	1-20/Holding	Must be an approved DRIT term.	
54	Security Classification of Posting Terms	C	A	1	A	1	#24	Yes+	Yes	1-20/Holding	Must have a value of S,C,R, or U. +An entry is required when there is an entry in "Posting Terms/ Descriptors".	
55	Price of Item	A	N	7			N/A	Yes		1/Holding	Must be in currency format.	
56	Postage & Handling Cost	A	N	7			N/A			1/Holding	Must be in currency format.	
57	Total Cost	A	N	8			N/A	Yes		1/Holding	Must be in currency format and	

TABLE B-1. DATA ELEMENTS FOR THE DNA LOCAL AUTOMATION MODEL (CONTINUED)

									must equal value of fields 51+52.	
58	Total Cumulative Expenditure	A	N 10		N/A	Yes		1/Holding	Must equal previous value minus value of field 53.	
59	Publisher's Address	A	A/N 80		N/A			1/Holding	None	
60	Publisher Point of Contact	A	A 40		N/A			1/Holding	None	
61	Point of Contact Phone No.	A	A/N 20		N/A			1/Holding	None	
62	Date ordered	A	N 6		N/A	Yes		1/Holding	None	
63	Reclassification Date	C	N 6		N/A	Yes#		1/Holding	# For holdings with "Report Classification" of S,C, or R.	
64	Subject Fields and Groups	C		A/N 6	#2	Yes		1-8/Holding	None	Identify the general area of science or technology covered by the report.
65	Descriptive Note	C		A/N 120	#9			1/Holding	None	Word or phrase which denotes type of report, e.g. "Final","Annual","Interim".
66	RDT&E Project Number	C		A/N 36	#16			1-2/Holding	None	*Required if there is an entry in "RDT&E Project Number".
67	SHIN Distribution/ Availability	C		A/N 1	#33	Yes		1-3/Holding	None	
68	RDT&E Task Number	C		A/N 36	#17			1-2/Holding	None	
69	RDT&E Work Unit Number	C		A/N 20	#25			1/Holding	None	
70	Monitoring Agency Acronym	C		A/N 30	#18		Yes#	1-2/Holding	#An entry in the following field requires an entry in this field.	Denotes the acronym prefix assigned a report by the government office monitoring or sponsoring the research.
71	Monitoring Agency Series Number	C		A/N 42	#19		Yes+	1-2/Holding	+An entry in the preceding field requires an entry in this field.	
72	Abstract	C		A/N 1760	#27			1/Holding	None	
73	Abstract Classification	C		A 1	#28			1/Holding	An entry is required when there is an entry in "Abstract Classification". A value of "U" is required when Report Classification is "U". This classification entry may not be higher than "Report Classification".	

TABLE B-1. DATA ELEMENTS FOR THE DNA LOCAL AUTOMATION MODEL (CONTINUED)

74	Regrade Date	C		A	1	#32		Yes^	1/Holding	^Entry is required when "Report Classification","Subject Heading Classification", or "Posting Term Classif." is S,C, or R.	
75	Annotation/Index Annotation	C		A/N	450	#30			1/Holding	None	
76	Serial Code/Source Series	C		A/NN	19	#34			1/Holding	None	
77	Corporate Author Code	C		N	6	#35		Yes	1/Holding	None	
78	Classification Authority	C		A/N	100	#37			1/Holding	None	
79	Declassification Date/Event	C		A/N	100	#38		Yes#	1/Holding	#See DTIC Handbook 4185.8, "Data Element Dictionary", pp. II-86 & II-87, for conditions in which this field is required.	
80	Downgrade Date/Event	C		A/N	100	#39		Yes+	1/Holding	+See DTIC Handbook, p. II-88	The date or event after which a secret report becomes confidential
81	Extension Authority	C		A/N	100	#45		Yes^	1/Holding	^See DTIC Handbook, p. II-96	The classification authority who authorized classification for more than 6 years
82	Review Date	C		A/N	7	#46		Yes$	1/Holding	$See DTIC Handbook, p. II-97	
83	Reason for Extension	C		N	1	#47		Yes@	1-8/Holding	@See DTIC Handbook, p. II-98	Identifies the reason justifying beyond 6 years
84	SHIN Holding Symbol	C		A/N	15	#48		No	1/Holding		

* Key to Data Categories
  C = Catalog/Bibliographic Data
  P = Patron/Circulation Data
  A = Acquisition/Budget Data

** Key to Format Types
  N = Numeric Characters Only (0-9)
  A = Alphabetic Characters Only (A-Z)
  A/N = Alphabetic, Numeric, and Special Characters
  A/NN= Alphabetic and Numeric Characters but No Special Characters

APPENDIX C

DESCRIPTION OF HIERARCHY-INPUT-PROCESS-OUTPUT CHARTS AND SYMBOLS

The Hierarchy-Input-Process-Output (HIPO) design methodology uses a series of charts to depict the flow of processes and data within a system. Figures 4-2 and 4-7 in Section 4 of this program specification are the input-process-output charts for the Local Automation Model (LAM). This appendix describes briefly the format and symbols used on the charts. For a more detailed explanation of the HIPO methodology, see "System Design and Documentation -- An Introduction to the HIPO Method," Harry Katzan, Jr., Van Nostrand Reinhold Company, New York (ISBN 0-422-24267-0).

HIPO Charts Symbols.

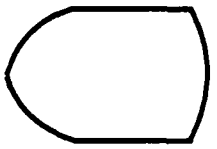
Figure C-1 shows symbols used in preparing the LAM HIPO charts contained in this Program Specification.

HIPO Chart Formats.

Each chart contains a heading section that identifies the system, the function or process within the system, and the date of chart preparation or latest revision. Below the heading section, the chart contains three distinct areas indicated by the large vertical boxes. The left-hand box contains the input symbols and descriptions, the center box contains a description of processes or processing in steps making use of the inputs, and the right-hand box contains the process output symbols and descriptions. The arrows connecting the inputs, processes, and outputs indicate the sequential relationship among the three separate elements of the chart. An input may be used by one or several processes, and a process can produce several outputs, some of which may serve as inputs to subsequent processes. In general, the order of execution for the processes begins at the top of the page and proceeds to the bottom.

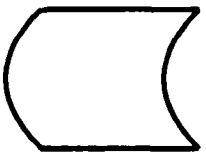
The processing steps contained within each chart are explained in Section 4.5, "Program Logic." In general, each process block within a chart will be implemented as an application program

FIGURE C-1. HIPO CHART SYMBOLS



Indicates a terminal with video display and keyboard used for entering inputs required for a process or for visually displaying to the user outputs from a process.

Shows the flow of inputs or outputs to or from a process. Also used to show the transfer or flow of processing control.

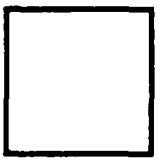


Indicates the use of on-line storage of files, which may be process inputs or outputs.

Used to indicate a document input or output for a process. Reports produced by a process are generally displayed as documents.

On-page connector used to indicate an exit to or entry from another part of the chart. The letter contained within the symbol indicates which connector is exited to or entered from.

Off-page connector used to indicate an exit to or entry from another chart within the package of system charts. The number within the system designates the chart to which the exit is made or from which the entry is made.



When used to enclose several symbols (such as on-line storage and display terminal symbols) this indicates a collection or group of inputs or outputs related to a process.

or system utility. In some cases, the process may be implemented as several programs because of unusual complexity or size. The charts are refined as software development progresses to reflect these changes.

END

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